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Analyzing the Impact of Science Practicum on Sixth-Grade Students' Cognitive Development

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ABSTRACT

This study aims to analyze the implications of science practicum learning on the cognitive development of sixth-grade students at SD Negeri 5 Nongan. This study employs a descriptive qualitative research design and was conducted at SD Negeri 5 Nongan. The subjects of this research were one teacher and 15 sixth-grade students. Data collection methods used interviews, and the instrument was an interview sheet. Data analysis techniques utilized a descriptive statistical analysis approach. The results of this study indicate that science practicum learning for sixth-grade students at SD Negeri 5 Nongan has been implemented routinely and effectively. The science practicum has proven to be an effective learning method in improving students' understanding, skills, motivation, and learning outcomes. In this context, the teacher acts as a facilitator, in alignment with the Merdeka Curriculum. The science practicum provides an interactive, hands-on learning experience, helping students deeply comprehend concepts while enhancing their critical and analytical thinking skills. Based on these findings, it is recommended that teachers use science practicums employing simple and easily understood media, such as the surrounding environment and tangible objects, as learning tools for science practicums. This approach is expected to make science practicums more effective and engaging for students.

Keywords: practicum, science, cognitive, learning

INTRODUCTION

Education is an effort to realize the inheritance of culture from one generation to the next, which can make the new generation a role model based on the teachings of the previous generation. Education is a planned endeavor to create an atmosphere and learning process so that students can actively develop their potential, such as cultivating spiritual and religious strength, personality, self-control, intelligence, and skills. Education cannot be separated from humans because humans will become both the subjects and objects of the educational effort itself. The importance of education for students is that it enables them to develop their potential. According to the Law on the National Education System No. 20 of 2003, education is defined as “a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have spiritual and religious strength, self-control, personality, intelligence, noble character, and skills needed for themselves and society.” Thus, education serves as a means to guide students to become capable and reliable individuals [1]. Education at the elementary school level also plays a vital role in instilling character values and cognitive development in children through teaching, for example, science learning.

Science learning (Natural Sciences) consists of three components: product, process, and attitude. The product includes all facts, concepts, principles, laws, theories, and knowledge. The process involves thinking processes and scientific methods to discover and develop concepts and knowledge [2]. Furthermore, that these three components must be fulfilled comprehensively in order for science learning to be considered complete—not only limited to learning facts, concepts, principles, and laws, but also learning how to obtain information, apply technology in science, work scientifically, and develop thinking skills. Science has a great potential to instill character values because the science curriculum is systematically designed to make learning interactive, inspiring, enjoyable, challenging, and motivating students to be active and participate actively. It also provides sufficient space to foster creativity, independence, and the psychological development of children[3]. The essence of science is how to create scientific products, processes, and attitudes [4]. The process of science learning is influenced by several factors, such as the implementation of practical activities.

Practical work (practicum) is a series of activities that allows students to acquire skills in a scientific process with the aim of finding evidence to support a particular theory through the activity[5]. To enhance science learning, a practical teaching method that can create conditions for achieving scientific concepts and the scientific process components is to conduct learning through practical activities [6]. Practicum is a subsystem of learning, which is a structured and scheduled activity providing students the opportunity to gain real experience in order to improve their understanding of theory. Practicum activities are conducted to prove that a concept being studied can be better understood through several theories. These science practicum activities align with the cognitive development of elementary school students, making them interested and serious in carrying out practicum activities, which ultimately lead to optimal learning outcomes in the form of attitudes, knowledge, and skills [7].

Cognitive development refers to the advancement of complex thinking processes, including reasoning and problem-solving abilities. The enhancement of cognitive capacity facilitates the mastery of extensive knowledge and enables individuals to function effectively in everyday life[8]. Early childhood brain development is optimally achieved through environmental support, which typically involves stimulation of various developmental domains such as motor skills, intellectual growth, socio-emotional development, and language acquisition.In terms of cognitive development, the desired competencies and learning outcomes for children include the ability to think logically and critically, provide sound reasoning, solve problems, and identify cause-and-effect relationships when addressing challenges, as noted . Children's cognitive progress can be assessed through their developmental milestones and thought processes, which involve brain functions used to recognize, comprehend, and assimilate knowledge. Cognitive development is intrinsically linked to intellectual growth and mental maturation. According to the cognitive development theory proposed by Piaget and Harlock [9], children actively construct knowledge and understanding through four distinct stages of cognitive development. Overall, cognitive development is a critical dimension of human growth that pertains to an individual's ability to acquire knowledge and relate learned information to their surrounding environment.

Observations during the learning process at SD Negeri 5 Nongan indicate that several students appear insufficiently prepared to engage actively in lessons and at times exhibit signs of stress. Such challenges are particularly evident in subjects less favored by students, notably Mathematics and Natural Sciences, where a lack of enthusiasm tends to result in disengagement. This condition contributes to an uninspiring classroom atmosphere, which can lead to boredom and negatively impact students' cognitive development. These challenges also affect instructional practices, as some teachers tend to overlook the importance of appropriate teaching models during lesson delivery. It has been observed that many educators lack a thorough understanding of practicum methodologies and their effective implementation. Consequently, there is a pressing need for well-structured instructional modules to support the learning process. As stated, teaching materials or modules serve as vital tools that bridge students' experiences and knowledge, facilitating their acquisition of information, skills, and competencies in the learning process. Several previous studies underscore the critical role of practicum-based learning in enhancing students' cognitive abilities. Demonstrated that practicum activities significantly deepen students' understanding of scientific concepts while fostering critical thinking skills[10]. Similarly, researchrevealed that practicum implementation effectively increases student motivation and academic achievement [11]. Furthermore [12] found that practicum-based instruction significantly boosts student engagement and learning outcomes in elementary science education

Research on the implications of practical learning in Natural Sciences on students' cognitive development has been extensively examined in prior studies. Firstly,[13], in their study which bears significant similarity to the present research, assert that practicum within Natural Sciences education constitutes a critical pedagogical method that substantially aids students in comprehending scientific concepts in a tangible manner. The practicum activities are posited to deepen students' knowledge and concurrently enhance their critical thinking abilities. Moreover, through engagement in practicum, students are able to cultivate practical skills and apply scientific principles within real-life contexts. This pedagogical approach is instrumental in fostering students' intrinsic motivation towards science and in elucidating the applicability of scientific concepts in everyday life. Consequently, practicum should be regarded as an essential component of Natural Sciences instruction and must be effectively integrated into the school curriculum to ensure optimal development of students' cognitive capacities and practical competenciesempirical evidence indicating that the implementation of practicum activities significantly enhances students' motivation and academic achievement [14]. Demonstrated that practicum-based learning in elementary schools can be effectively implemented in the student learning process and significantly enhances students' interest and academic achievement [15]. These three studies share a similar objective, namely to develop students' cognitive abilities through science practicum activities. Through the implementation of practicum, students are expected to master scientific concepts, apply them in everyday contexts, and improve their critical thinking skills. Moreover, these studies reveal that practicum-based learning fosters greater student engagement in the teaching and learning process, which positively influences both their motivation and understanding of science content.

This present study contributes novel insights by focusing specifically on sixth-grade students at SD

Negeri 5 Nongan. While previous research has addressed the role of science practicum at the elementary education level, few studies have specifically examined the impact of practicum on cognitive development in sixth-grade students. Consequently, this research provides a more comprehensive perspective on how science practicum can contribute to the advancement of cognitive skills during the final stage of elementary education, prior to students' transition to the subsequent educational level.

This study aims to analyze the implications of practical learning in Natural Sciences on the cognitive development of sixth-grade students at SD Negeri 5 Nongan.The research aims to provide a comprehensive understanding of how practicum-based Natural Sciences instruction contributes to cognitive development among sixth-grade students at SD Negeri 5 Nongan.

RESEARCH METHODS

This study employs a qualitative descriptive research design. Qualitative research is intended to understand specific phenomena, which may include experiences of research subjects such as behaviors, perceptions, motivations, and actions. These phenomena are described holistically in words that reflect the actual conditions[16]. The data obtained are processed using qualitative methods with an inductive/qualitative analysis approach, where the emphasis is placed on meaning rather than generalization.The study was conducted at SD Negeri 5 Nongan, located in Nongan Village, Rendang Subdistrict, Karangasem Regency. The research subjects included the sixth-grade teacher and 15 students from the same grade. The aim of this research is to examine the implications of science practicum-based learning on the cognitive development of sixth-grade students at SD Negeri 5 Nongan.The primary data collection technique used in this study is the interview method. Interviews are used to gather data through communication with informants. In this study, interviews were conducted with the sixth-grade teacher as the school representative [17]. The researcher also relied on interview data as the second data source.The research instrument employed was an interview guide sheet, used to conduct structured interviews with the sixth-grade teacher at SD Negeri 5 Nongan. The indicators used in the interview include: Frequency of practicum implementation, Practicum media used, Availability of practicum guidelines, Students' interest in practicum activities, Implementation process of practicum, Evaluation methods used in practicum learning, Challenges encountered during implementation, Students' cognitive performance, and Overall assessment results.

The data analysis technique adopted in this research is descriptive statistical analysis. This analysis is limited to presenting data in basic descriptive form, without examining relationships among variables, testing hypotheses, making predictions, or drawing broader conclusions. Descriptive statistical analysis is used to present the research findings in a concise and clear manner. It serves to process the obtained data into descriptive formats that are easier to interpret and understand. The interview data are presented narratively to offer a comprehensive view of student and teacher responses to the implementation of science practicum-based learning.

RESULTAND DISCUSSION

This research was conducted with the teacher of SD Negeri 5 Nongan. The study utilized an instrument in the form of several questions. The results indicate that the implementation of science practicum-based learning has had a fairly good impact on the cognitive development of sixth-grade students at SD Negeri 5 Nongan. This is evidenced by the interview with the sixth-grade teacherat SD Negeri 5 Nongan. The results of the interview regarding the science practicum at SD Negeri 5 Nongan are presented in the table below.

Table 1. Interview Results

Indicator	Question	Answer
Practicum Frequency	How often do you conduct science practicums in class?	In the interview, the teacher stated that science practicums are frequently conducted during science learning.
Practicum Media	What practicum media are used in science practicums in class?	The media used by the teacher in practicum learning include concrete objects, abstract materials, and the surrounding environment.
Practicum Guide	What practicum guide is used in classroom learning?	The practicum guides used by the teacher in the learning process are the teacher's guidebook and learning reference books.
Student Interest in Practicum	How are students' responses and interest toward practicum activities in class?	In the classroom learning process involving science practicums, the teacher stated that student responses and interest in the practicum activities were quite active and positive, and students were motivated in learning.
Practicum Implementation	How is the implementation process of practicums in your class? Is it effective?	In the interview, the teacher said that the implementation of practicums in class is quite effective.
Evaluation Used	In the evaluation stage, what evaluation tools do you use to assess students? Are they	In the evaluation stage, the teacher usually uses observation sheets for group work and written tests for individual assessment.

Indicator	Question	Answer
	in the form of tests or others?	
Challenges Encountered	Are there any challenges faced during the implementation of science practicums in the classroom?	The challenges faced by the teacher include not being able to guide all students due to time constraints. In addition, facilities and infrastructure also pose challenges in implementing science practicums, although these can be overcome by utilizing the surrounding environment.
Students' Cognitive Scores	How are students' cognitive scores in the practicum learning process?	The teacher stated that because practicums are conducted frequently, students' cognitive scores are good, as they directly engage in analysis and are able to process and discuss the results.
Assessment Results	What efforts do you make if students' cognitive scores in science practicum learning are low?	According to the sixth-grade teacher, the effort that can be made is to conduct reflection, possibly by revising the lesson plan or teaching module, as well as modifying the learning assessment.

Based on table 1 showed the results of interviews conducted by the researcher regarding the implementation of science practicums at SD Negeri 5 Nongan, it was found that the science practicum activities have been running well. This can be seen from the interview results above, which indicate that the use of the Merdeka Curriculum also contributes to the frequent use of practicums in learning. Therefore, teachers must be able to determine appropriate practicum media for science learning so that the teaching and learning process can be creative, innovative, and enjoyable. The use of engaging and creative science practicums will attract the interest and increase the learning motivation of sixth-grade students at SD Negeri 5 Nongan.

The sixth-grade homeroom teacher stated that science practicums are frequently used in learning. In several class sessions, practicums were conducted with the aim of deepening students' understanding—for example, a science practicum on the process of photosynthesis in plants. These activities are often carried out in every meeting. This aligns with the interview result with the sixth-grade homeroom teacher at SD Negeri 5 Nongan, who explained that under the Merdeka Curriculum, teachers act as facilitators. Practicum activities in learning are indeed very important, as they allow students to be actively involved in the learning process and enhance their understanding of the material.This is in line, which showed that practicum activities play a vital role in the learning process[18]. Through hands-on practice, students can engage more actively, which significantly improves their comprehension of the subject matter. Additionally, stated that science learning based on practicum is effective in increasing students' active participation in the classroom [19]. These findings indicate that science education, in particular, requires appropriate methods and strategies to attract students' interest and encourage their active participation in class. One such method is through science practicum activities, which help deepen sixth-grade students' understanding at SD Negeri 5 Nongan.

Science practicums also require appropriate media to support the activities, as was also done by teacher, who utilized three types of media: concrete objects, abstract materials, and the surrounding environment. This is reflected in the interview results, which indicated that the media used in learning consisted of concrete, abstract, and environmental elements. At the beginning of a lesson, teachers are expected to have a guide or module to use during the practicum in order to effectively plan the practicum-based learning. This aligns with what was stated by the classroom teacher.

Furthermore, practicum activities are supported by the creative and adaptive management of learning media, such as utilizing the surrounding environment as a direct learning resource. This approach provides students with real-world experiences and fosters a deeper understanding of science concepts. Thus, the implementation of science practicums at SD Negeri 5 Nongan serves as a relevant and effective learning model for improving the quality of education, particularly in developing students' cognitive abilities, motivation, and meaningful learning experiences. These findings align which states that science practicum media based on the environment and concrete objects can significantly enhance student learning outcomes[20]. Added that students need learning media that are simple, creative, engaging, and easy to understand [21]. This indicates that the learning media used can be adapted to the students' environment by selecting creative and easily accessible materials—such as utilizing the surrounding environment as science practicum media.

The lesson plan prepared by teacher—who also serves as the sixth-grade homeroom teacher and interviewee—stated that he still uses guidebooks in planning lessons. In the practicum process, guidebooks are also necessary to implement learning in a more structured and directed manner, so that the objectives of the practicum learning process can be achieved optimally. Guidebooks serve as the main reference in organizing learning steps, both theoretical and practical, and help ensure that each material delivered aligns with students' needs. The guidebooks used by the sixth-grade teacher include the teacher's book and the student's book.This aligns with the findings of which indicate that

the development and use of guidebooks—such as science practicum modules—are effective, relevant, and appropriate to students' needs in the science learning process. In addition, stated that teachers' skills in designing guides such as modules are essential in creating creative and engaging science practicum guides for students. This suggests that guidebooks, including modules, student books, and teacher books, play a crucial role in supporting students' learning processes [22].

The sixth-grade homeroom teacher, explained that science practicums are quite effective in motivating students to learn. He also noted that science practicums in Natural Sciences (IPA) learning are effective in improving student learning outcomes. This finding alignswhich states that the implementation strategy of science practicums is effective in enhancing student achievement. This indicates that practicums play a strategic role in the learning process, particularly in improving students' understanding and abilities in science subjects.Through the practicum approach, students do not only receive theoretical knowledge but also gain hands-on experiences that help them apply the concepts they have learned. Furthermore, such activities help develop students' critical and analytical thinking skills—key aspects of the learning process. The effectiveness of practicums, as highlighted by the homeroom teacher, and supported by the research ofemphasizes the need for continued optimization of this approach in education. This also suggests that well-managed practicum activities—such as proper material preparation, the use of relevant tools and materials, and teacher guidance—can enhance students' interest and motivation in learning, thereby improving their overall academic performance.

The sixth-grade homeroom teacher, reported that the implementation of practicum activities in the classroom was relatively effective. This finding suggests that practicums contribute positively to the learning process. By employing a practicum-based approach, students engage in concrete and interactive learning experiences, which enhance their deep understanding of concepts. Nonetheless, the effectiveness of practicums depends on proper management, including meticulous planning, adequate provision of tools and materials, and continuous supervision throughout the practicum. This result corroborates the findings who demonstrated that science practicums positively affect and significantly enhance students' motivation to learn. These findings highlight thatpracticums serve not only as instructional methods but also as essential means to develop students' critical and creative thinking skills. Direct student involvement in practicum activities enables them to comprehend theoretical knowledge and relate abstract concepts to real-world contexts. Practicums offer opportunities for students to explore, observe, and draw conclusions based on empirical evidence acquired independently. Furthermore, the success of practicum implementation is strongly contingent upon thorough preparation by educators. Adequate provision of equipment and materials, effective time management, and optimal guidance during activities are critical factors that contribute to improving the quality of learning. When practicums are well-designed and effectively executed, student motivation increases, which consequently leads to significant improvements in learning outcomes. As noted increased motivation is among the primary positive outcomes associated with the implementation of practicum-based learning

At the evaluation stage, the sixth-grade homeroom teacher employed two primary assessment methods: observation sheets to assess group work and written tests to evaluate individual performance. This combined evaluation approach enables the teacher to comprehensively assess students' abilities in terms of both collaboration and individual understanding. The observation sheets facilitate the teacher's assessment of students' skills in teamwork and active participation during the practicum, while written tests measure their independent mastery of concepts. This evaluation strategy is essential to ensure that students' learning outcomes align with the intended objectives. This finding is consistent, who emphasized that assessment is a critical component of the learning process, and authentic assessment serves as an effective method to evaluate students' knowledge through practical tasks or activities rather than solely written examinations. Authentic assessment encompasses observation, portfolios, peer assessment, written tests, and performance evaluation. Particularly in science practicums, portfolio assessment effectively evaluates students' cognitive, affective, and psychomotor domains while simultaneously reflecting their overall development. Assessment instruments must be tailored to the needs, objectives, characteristics of the material, and learning outcomes. Science practicums provide students with concrete experiences to apply scientific concepts, while the implementation of authentic assessment can enhance active engagement, critical thinking skills, and scientific competencies. Furthermore, this approach assists teachers in measuring students' progress more accurately and in ways that are relevant to real-life contexts[23].

The implementation of science practicums has been relatively effective; however, several challenges remain, particularly the lack of adequate facilities and infrastructure, as well as limited time. The sixth-grade homeroom teacher reported difficulties in providing comprehensive guidance to all students due to time constraints. This condition potentially reduces the optimality of practicum activities, especially in delivering directions and addressing students' questions. To overcome these challenges, improved time management strategies are necessary, such as dividing students into small groups with rotational schedules or involving additional assistants to aid supervision and guidance during the practicum. Furthermore, the lack of supporting facilities and infrastructure poses a significant obstacle in conducting science practicums. This finding aligns which identified the most fundamental difficulties as being related to facilities and infrastructure, as well as teachers'

challenges in managing instructional time. Therefore, teachers must be capable of seeking alternative solutions to conduct simple practicums, such as utilizing recycled materials or leveraging the surrounding environment. Educators are required to be proactive and creative in finding solutions to ensure that practicums can be conducted optimally despite limitations in tools and materials [24].

The sixth-grade homeroom teacher revealed that evaluation results indicate a significant improvement in students' cognitive scores. This is evidenced by the assessment conducted following the implementation of the science practicum, which demonstrated notable progress in students' cognitive development. For students with low scores, reflective learning through modules was utilized to enhance their motivation and academic achievement. Overall, the science practicum activities proved effective in supporting cognitive development and improving students' learning outcomes. Evaluation of student learning outcomes after the use of science practicums was conducted through observation sheets and written tests, showing positive growth in cognitive scores throughout the learning process. Through the science practicum, students' cognitive abilities improved significantly in conjunction with the use of practicum-based instructional media. Moreover, students with lower cognitive scores received learning reflection via modules aimed at boosting their motivation and academic performance in the sixth grade. This aligns with the findings who demonstrated that cognitively, practicums help students acquire deeper knowledge while enhancing critical thinking skills. Additionally, practicums support the development of practical skills and the application of scientific concepts in real-life situations, thereby increasing students' interest in science. This activity also strengthens their understanding of the relevance of scientific concepts to everyday life. Therefore, practicums should be a core element of science education and optimally integrated into the curriculum. Well-designed practicums can meet cognitive demands, including improving memory, comprehension, application, analysis, evaluation, and fostering students' creativity.

Based on the discussion above, the results of this study indicate that the implementation of science practicum in sixth-grade learning at SD Negeri 5 Nongan has been carried out effectively and routinely. This success is attributed to the adoption of the Merdeka Curriculum, which positions teachers as facilitators and encourages student-centered learning. Science practicum offers concrete, interactive experiences that engage students directly with scientific concepts, allowing them to develop critical thinking and cognitive skills through observation, experimentation, and analysis. This process helps students construct meaningful understanding rather than simply memorizing theoretical knowledge. In this context, the research presents a new narrative on how hands-on activities contribute significantly to students' cognitive advancement at the final stage of elementary education.

The key findings show that practicum activities improve students' understanding, motivation, skills, and learning outcomes. Teachers use accessible media such as concrete objects, abstract representations, and elements from the surrounding environment. Evaluation methods combine observation sheets for group work and written tests for individual assessments, resulting in a comprehensive appraisal of students' performance. The study also reveals a noticeable increase in students' cognitive achievement following the implementation of science practicum.Several factors contribute to these outcomes, including the structured and frequent use of practicum, the availability of simple and relatable learning media, and the students' active engagement in the learning process. The use of real-life examples and exploration enhances their ability to connect theoretical knowledge with everyday experiences. Moreover, the presence of a learning guide or teacher's manual ensures that the practicum is well-planned and aligned with learning objectives.

This study offers several advantages, such as its relevance to 21st-century learning needs—particularly in fostering critical thinking and scientific reasoning. It provides a contextual learning approach that is effective and easily applicable in elementary schools, especially those with limited resources. However, the study is limited by its narrow sample, involving only one class and one teacher, and lacks quantitative data such as pre-tests and post-tests. It also does not explore specific dimensions of cognitive development, such as analysis, synthesis, and evaluation, in detail.When compared with previous studies, this research aligns with the findings[25], [26], and[27], all of which emphasize the effectiveness of science practicum in enhancing cognitive and affective learning outcomes. The novelty of this study lies in its specific focus on sixth-grade students and their cognitive development at the transitional stage before entering secondary education. It offers a more detailed and focused view of the benefits of practicum at this critical level.The implications of this study are significant. It emphasizes the need for interactive, hands-on science learning in elementary schools and encourages teachers to design practicum activities using local, simple materials. The research also highlights the importance of providing structured learning modules and optimizing time management during practicum. In addition, the use of authentic assessments such as portfolios and group projects is recommended to capture students' holistic development. Overall, this study contributes to improving instructional practices, strengthening cognitive skills, and promoting engaging science education aligned with the goals of the Merdeka Curriculum.

CONCLUSION

Based on the results of the analysis and discussion, it can be concluded that the implementation of science practicums for sixth-grade students at SD Negeri 5 Nongan has been conducted routinely and

effectively. Science practicums have proven to be an effective instructional method for enhancing students' understanding, skills, motivation, and learning outcomes. In this context, the teacher acts as a facilitator in accordance with the Merdeka Curriculum. The science practicum provides concrete and interactive learning experiences that assist students in comprehending concepts deeply, while simultaneously improving critical and analytical thinking skills. Various media used during the practicum include concrete objects, abstract materials, and the surrounding environment, which support students in linking theory with real-world applications. Practicums are considered essential because they increase student engagement, deepen content understanding, and motivate learners. Based on these findings, it is recommended that teachers utilize simple media such as local materials or everyday objects that are more relevant to students' lives. Additionally, dividing students into small groups and implementing structured time management will allow for more effective guidance. Teachers are also advised to provide structured practicum modules to assist students and ensure that learning objectives are achieved. Developing teacher competencies through training on practicum-based learning is also highly important. Regarding evaluation, the use of authentic assessment methods, such as portfolios and group projects, can provide a more comprehensive picture of student development. To address constraints related to facilities and infrastructure, teachers can use recycled materials or leverage the surrounding environment for practicums. With these measures, science practicums are expected to be conducted more effectively and engagingly for students.

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REFERENCES

[1] A. Rahman BP, S. A. Munandar, A. Fitriani, Y. Karlina, and Yumriani, "Pengertian Pendidikan, Ilmu Pendidikan, dan Unsur-Unsur Pendidikan," *Al UrwatulWutsqa*, vol. 2, no. 1, pp. 1–8, 2022.

[2] Nurjanah, U. Cahyana, and Nurjanah, "PengaruhPenerapan Online Project Based Learning Dan BerpikirKreatifTerhadapKeterampilan Proses SainsSiswa Kelas IV Pada Pelajaran IPA," *Buana Pendidikan*, vol. 17, no. 1, pp. 51–58, 2021, [Online]. Available: http://jurnal.unipasby.ac.id/index.php/jurnal_buana_pendidikan/index

[3] E. Wahyudiana, J. Sagita, V. Iasha, A. Setiantini, and A. Setiarini, "Modul Praktikum IPA BerbasisProblem Based Learning UntukMeningkatkanKemampuanPemecahanMasalah," *Buana Pendidikan*, vol. 17, no. 2, pp. 161–167, 2021, [Online]. Available: http://jurnal.unipasby.ac.id/index.php/jurnal_buana_pendidikan/index

[4] S. Fatimah and I. Kartika, "Pembelajaran IPA Sekolah Dasar Berbasis Pendidikan Karakter," *Al-Bidayah*, vol. 5, no. 2, pp. 281–297, 2013.

[5] M. Aminullah, "Hubungan Antara KeterlaksanaanPraktikum IPA dan MotivasiBelajardengan Hasil Belajar IPA Siswa Kelas 8 SMP Negeri di KabupatenEnrekang," *JurnalElektronik Universitas Cokroaminoto*, vol. 04, no. 1, pp. 87–97, 2019.

[6] T. Astuti, "ManajemenPraktikumPembelajaran IPA," *Manajer Pendidikan: JurnalIlmiahManajemen Pendidikan Program PascaSarjana*, pp. 57–64, 2015.

[7] I. M. A. Winangun, "Project Based Learning: Strategi PelaksanaanPraktikum IPA SD Dimasa Pandemi Covid-19," *Edukasi: Jurnal Pendidikan Dasar*, vol. 2, no. 1, pp. 11–20, 2021, [Online]. Available: http://jurnal.stahnmpukuturan.ac.id/index.php/edukasi

[8] Y. Novitasari, "AnalisisPermasalahan: PerkembanganKognitif Anak Usia Dini," *Jurnal Pendidikan Anak Usia Dini*, vol. 2, no. 1, pp. 82–90, 2018.

[9] A. Izzudin, "UpayaMengembangkanKemampuanKognitif Anak Usia Dini Melalui Media PembelajaranSains," *JurnalEdukasi dan Sains*, vol. 3, no. 3, pp. 542–557, Jul. 2021, doi: 10.33578/kpd.v1i3.25.

[10] S. Mulia and S. Murni, "ImplikasiPembelajaranPraktikumIlmuPengetahuanAlamDalamKemajuanKognitifSiswa," *Science Education Research (Search) Journal*, vol. 1, no. 1, pp. 1–11, 2022, [Online]. Available: https://e-jurnal.iainsorong.ac.id/index.php/jaser

[11] Y. Amakraw and N. Kartika, "Strategi ImplementasiPraktikumPembelajaranIlmuPengetahuanAlamUntukSiswaSekolah Dasar dan Menengah," *Science Education Research (Search) Journal Program StudiTadris IPA*, vol. 1, no. 1, pp. 34–41, 2022, [Online]. Available: https://e-jurnal.iainsorong.ac.id/index.php/jaser

[12] N. Huda and S. Fatonah, "Pembelajaran IPA BerbasisPraktikum di MI Ngadirejo 1," *Al-Madrasah: Jurnal Pendidikan Madrasah Ibtidaiyah*, vol. 7, no. 4, p. 1923, Oct. 2023, doi: 10.35931/am.v7i4.2582.

[13] F. Nikmah, A. Zahrinna, and M. Jalil, "PraktikumSederhanaPembelajaran IPA untukMeningkatkan Hasil BelajarKognitif dan Keterampilan Proses Sains di MI Al Hikmah Kajen Pati," *Indonesian Journal of Islamic Elementary Education*, vol. 3, no. 1, pp. 1–13, 2023, [Online].

Available: http://e-journal.uingusdur.ac.id/index.php/ijiee
[14] A. Darmawan and F. Sangaji, "SeberapaEfektifPenggunaan Model Pembelajaran Scientific dalamPraktikumIlmuPengetahuanAlam," *Science Education Research (Search) Journal*, pp. 14–21, 2023, [Online]. Available: https://e-jurnal.iainsorong.ac.id/index.php/jaser
[15] D. Yuliantika, "ImplementasiPraktikumIlmuPengetahuanAlamdalamPenguatanKualitasPsikomotorikSiswa," *Science Education Research (Search) Journal*, pp. 12–22, 2022.
[16] F. R. Fiantika, M. Wasil, S. Jumiyati, and dkk, *MetodologiPenelitianKualitatif*. Sumatera Barat: Sumatera Barat: PT. Global EksekutifTeknologi, 2022. [Online]. Available: www.globaleksekutifteknologi.co.id
[17] F. Hikmawati, *MetodologiPenelitian*. Depok: PT. Raja GrafindoPersada, 2020.
[18] E. Febriyanti and M. Mayarni, "Pengaruh Strategi PembelajaranAktifTipe Crossword Puzzle Berbantuan Media Flip Book TerhadapKeaktifanBelajar IPA Siswa Kelas IV Sekolah Dasar," *Jurnal Pendidikan Sains Indonesia*, vol. 10, no. 4, pp. 816–832, Oct. 2022, doi: 10.24815/jpsi.v10i4.26281.
[19] A. Nuai and S. Nurkamiden, "UrgensiKegiatanPraktikumDalamPembelajaranIlmuPengetahuanAlam di SekolahMenengahPertama," *Science Education Research (Search) Journal*, pp. 48–63, 2022.
[20] L. Erviana, "Pemanfaatan Media PembelajaranBerbasisLingkunganSebagai Sarana Praktikum IPA untukMeningkatkanPemahamanKonsepSiswa di SMP-IT Ar Rahman Pacitan," *JurnalDinamika Pendidikan Dasar*, vol. 7, no. 2, pp. 71–77, 2015.
[21] N. L. Widiani and N. W. S. Darmayanti, "AnalisisKebutuhan Guru Terhadap Media Pembelajaran Video InteraktifDalamMuatan IPA di SD," *ADI WIDYA: Jurnal Pendidikan Dasar*, vol. 9, no. 1, pp. 89–95, 2024.
[22] N. W. S. Darmayanti, I. W. Suantara, N. P. E. Astuti, N. K. A. U. Dari, N. K. S. Partini, and K. Y. Yulandari, "EvaluasiPeningkatan Guru DalamPenyusunanPraktikum IPA BermuatanKarakter," *ORBITA: Jurnal Pendidikan dan IlmuFisika*, vol. 9, no. 2, pp. 324–331, 2023.
[23] D. R. Martatiyana and Faisal Madani, "PenerapanAsesmenAutentikdalamPraktikum IPA di Sekolah Dasar," *JurnalElementariaEdukasia*, vol. 6, no. 4, pp. 1741–1760, Dec. 2023, doi: 10.31949/jee.v6i4.7291.
[24] F. Prayunisa and A. D. Marzuki, "AnalisisKesulitanDalamPelaksanaanPraktikum IPA SD dan IPA Terpadu SMP," *NUSRA: JurnalPenelitian dan Ilmu Pendidikan*, vol. 5, no. 4, pp. 1635–1641, 2024, doi: 10.55681/nusra.v5i4.3085.
[25] S. Mulia and S. Murni, "ImplikasiPembelajaranPraktikumIlmuPengetahuanAlamDalamKemajuanKognitifSiswa," *Science Education Research (Search) Journal*, pp. 1–11, 2022, [Online]. Available: https://e-jurnal.iainsorong.ac.id/index.php/jaser
[26] F. A. Putri, N. Lubis, N. N. Siregar, W. Iskandar, and G. Matvayodha, "PendekatanPembelajaran IPA BerbasisSains di Pendidikan Dasar," *SITTAH: Journal of Primary Education*, vol. 5, no. 1, pp. 114–127, 2024, doi: 10.30762/sittah.v5i1.3280.
[27] R. Nurjanah, S. Purnamasari, and A. Rahmaniar, "AnalisisImplementasiPotensiLokaldalamPembelajaranIlmuPengetahuanAlam," *Jurnal Pendidikan MIPA*, vol. 14, no. 1, pp. 48–56, Mar. 2024, doi: 10.37630/jpm.v14i1.1476.