



**IMPLEMENTING A CONSTRUCTIVIST APPROACH TO ENHANCE
CRITICAL THINKING SKILLS IN INTEGRATED SCIENCE LEARNING
AMONG ELEMENTARY ISLAMIC SCHOOL STUDENTS**

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Received: April 23, 2024	Reviewed: May 2024	Published: June 24, 2024
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ABSTRACT

This research investigates the application of the constructivist approach in enhancing critical thinking skills in science learning. The subjects of this study include the principal, the 5B class teacher, and 30 students from class 5B at MIN 2 Bantul. The researchers employed a constructivist philosophical approach with a case study design. Data sources consisted of interviews, observations, documentation, and analysis of additional supporting documents. After data collection and aggregation, the data were analyzed using the interactive model by Miles, Huberman, and Saldana, which includes data condensation, data display, and conclusion drawing or verification. To ensure data validity, data triangulation was employed. The findings of this research indicate that utilizing a constructivist approach in science education enhances student engagement, fosters enthusiasm, and optimizes critical thinking skills in addressing learning challenges.

Keywords: Constructivism; Critical Thinking; Independence Curriculum; IPAS

ABSTRAK

Penelitian ini menginvestigasi penerapan pendekatan konstruktivis dalam meningkatkan keterampilan berpikir kritis dalam pembelajaran sains. Subjek penelitian ini meliputi kepala sekolah, guru kelas 5B, dan 30 siswa kelas 5B di MIN 2 Bantul. Peneliti menggunakan pendekatan filosofis konstruktivis dengan desain studi kasus. Sumber data terdiri dari wawancara, observasi, dokumentasi, dan analisis dokumen pendukung tambahan. Setelah pengumpulan dan penggabungan data, data dianalisis menggunakan model interaktif oleh Miles, Huberman, dan Saldana, yang meliputi kondensasi data, penyajian data, dan penarikan kesimpulan atau verifikasi. Untuk memastikan validitas data, dilakukan triangulasi data. Temuan penelitian ini menunjukkan bahwa penerapan pendekatan konstruktivis dalam pendidikan sains meningkatkan keterlibatan siswa, mendorong antusiasme, dan mengoptimalkan keterampilan berpikir kritis dalam menghadapi tantangan pembelajaran.

Kata Kunci: Konstruktivisme; Berpikir Kritis; Kurikulum Mandiri; IPAS



INTRODUCTION

Since 2020, the national examination has been abolished and replaced with the national assessment in 2021 (Asmarni & Zakir, 2023). Through the implementation of the national assessment, madrasahs are required to emphasize literacy-based learning. The six basic literacies that students must master to support 21st-century learning are reading literacy, writing literacy, numeracy, science literacy, digital literacy, and cultural and civic literacy. In madrasah ibtidaiyah, science literacy is related to natural sciences (Jauharin & Cahyaningsih, 2023). Natural sciences and social sciences are crucial subjects that students need to learn to face the challenges of the Industrial Revolution 5.0 in the global era.

In natural sciences (IPA) learning, students are required to think logically to explain natural phenomena or events around them (Rifai et al., 2020). They must be able to identify problems, evaluate, plan scientific investigations, interpret data and evidence scientifically, and then communicate their findings (Wiwin Kurniasih, Ana Ratna Wulan, 2021). Meanwhile, social sciences (IPS) teach students about systems consisting of interrelated elements that function according to specific rules, particularly those related to natural and social life in the context of diversity. IPS equips students with decision-making skills to solve everyday problems and teaches concepts and facts related to social sciences, encouraging them to become inclusive, democratic, peace-loving, and responsible citizens.

The implementation of IPA and IPS learning in the independent curriculum is

integrated into a new subject called Natural and Social Sciences (IPAS) (Sugih et al., 2023). The aim of IPAS learning is to teach students to view everything holistically, enabling them to manage the natural and social environment integratively (Wijayanti & Ekantini, 2023). In IPAS, students are often taught through various activities and learning stages that allow them to gain hands-on experience (Rahmawati et al., 2023). Science education in primary education emphasizes direct knowledge to develop skills needed to understand the environment (Budiwati et al., 2023).

The Programme for International Student Assessment (PISA) scores in 2022 showed a decline in learning outcomes internationally due to the pandemic. In Indonesia, there was a decline in all literacy aspects. Although Indonesia's PISA ranking increased by six positions compared to 2018, the science literacy score dropped from 396 to 383 points (Kemendikbud, 2023). To improve education quality, the government implemented computer-based national assessments (ANBK) and the Indonesian madrasah competency assessments (AKMI). ANBK and AKMI aim to diagnose students' competencies in literacy and numeracy.

According to an interview with Teacher NB from Madrasah Ibtidaiyah Negeri (MIN) 2 Bantul, fifth-grade students still struggle to understand national assessment questions, both ANBK and AKMI. The national assessment questions not only assess the competency of finding and accessing information but also interpreting, integrating, evaluating, and reflecting on it (Teacher NB, 2024). This requires students to not only

memorize but also understand and think critically. The 2023 AKMI results showed that although the science literacy report of the madrasah reached the proficient skill level, 44.26% of students were still at the capable skill level.

To support 21st-century learning, students are required to master the 4C skills: Creativity, Critical Thinking, Collaboration, and Communication. Critical thinking is a skill that everyone, especially students, must possess in every learning process (Rahayu et al., 2019) and it needs to be developed to support 21st-century learning (Ikhtiana et al., 2020). Critical thinking skills are essential to be taught to students from the primary education level because they help in solving problems encountered in daily life (I Ketut Suparya, n.d.). Critical thinking involves contemplating complex and rational concepts, evaluating them for scientific knowledge purposes through analysis and evaluation processes (Hidayat et al., 2019). Critical thinking skills can be observed from how well someone selects and uses available information in decision-making (Azrai et al., 2020), referring to the ability to identify, analyze, and solve problems creatively and logically to make judgments and take appropriate actions (Haryadi et al., 2022).

Learning is a process, a freedom to understand knowledge and build experiences. Through the knowledge and experiences gained, students can think critically, creatively, and imaginatively to create a conducive learning environment (Anisah et al., 2023). Therefore, it is crucial for teachers to use a constructivist approach in teaching. Constructivism can bridge the gap in

developing students' critical thinking skills. The cognitive development of madrasah ibtidaiyah students differs from that of secondary or high school students. Teachers need to design effective and optimal learning aimed at enhancing students' cognitive levels (Ultavia et al., 2023), so the application of the constructivist approach can benefit in improving critical thinking skills from the primary level.

According to constructivist theory, each child's learning is an independent and spontaneous process (Solovieva et al., 2023). The knowledge acquired by an individual is a result of specific learning constructions (Firdaus et al., 2023). Students have already built knowledge actively through their actions, giving it a unique meaning (Drljača, 2020). The constructivist approach emphasizes that knowledge acquisition results from the understanding we build ourselves. Students are given ample opportunities to learn independently and consciously (Ndaru Kukuh Masgular & Pinton Setya Mustafa, 2021). Constructivism believes that everyone builds new meanings in learning situations where they are actively engaged, based on what they see, hear, say, do, explore, and discover (Drljača, 2020) through extensive social interactions within the family, on the streets, in parks, and in the classroom. Schools are considered just one of many social institutions (Solovieva et al., 2023). Constructivism assumes that students are already capable of using their skills to seek and analyze information and think critically to solve problems or make decisions (Mataheru et al., 2020).

The goal of the constructivist perspective is to help students build scientific concepts using their skills (Ultavia et al., 2023). Teachers need to enhance students' knowledge through the learning process and strive to elevate their understanding to a higher level (Ndaru Kukuh Masgular & Pinton Setya Mustafa, 2021). Teachers' roles include facilitating and creating conditions for student development but not being solely responsible for it, acting as observers, participants among many others in the educational process, without a specific developmental role (Solovieva et al., 2023).

Constructivism serves as the foundational thinking framework in the contextual approach. This implies that knowledge is not merely a collection of data, facts, concepts, and rules to be memorized. Students construct and comprehend this knowledge through real-world experiences. It is crucial to habituate students to engage in problem-solving and to discover what is suitable and beneficial for them. Students must construct knowledge in their own minds. Critical thinking is the endeavor to verify the truth of information based on existing evidence, logic, and perception. Critical thinking skills involve a systematic and specific cognitive process used by students to analyze encountered problems, identify, and consider information to plan problem-solving strategies (Fitri, 2020).

Research conducted by Ahmad Firdaus suggests that constructivist theory plays a significant role in developing students' critical thinking skills (Firdaus et al., 2023). Sri Wardani's study indicates that there are alternative methods to enhance students'

critical thinking skills, one of which is the constructivist approach. Learning through a constructivist approach emphasizes the active and critical participation of students in constructing their own knowledge (Sri Wardani, 2016). Suci Muzfirah's research concludes that the constructivist approach can enhance student engagement in Islamic Religious Education (PAI) subjects. This approach helps build new understandings in students and encourages active participation in the teaching and learning process (Muzfirah, 2021).

This research focuses on the implementation of Integrated Science (IPAS) learning with a constructivist philosophical approach within the independent curriculum. The researchers hope that the findings of this study will contribute to enhancing the quality of IPAS learning for madrasah ibtidaiyah students. Through the constructivist philosophical approach, this research aims to increase student engagement in learning, foster enthusiasm, and optimize critical thinking skills in addressing problems encountered in IPAS learning within the independent curriculum at MIN 2 Bantul.

RESEARCH METHOD

This study employs a constructivist philosophical approach. The researcher conducted a qualitative case study at MIN 2 Bantul during the second semester of the 2023/2024 academic year. Data were collected through interviews, observations, and documentation involving the school principal, fifth-grade teachers, and 30 students from class 5B, consisting of 13 female and 17 male students. A purposive

sampling technique was used, selecting participants based on their competencies and achievements. The study focused on fifth-grade students as their developmental stage aligns with constructivist theory.

The implementation of a constructivist approach in 21st-century learning adheres to principles that require students to: (1) exhibit creativity and innovation, (2) communicate and collaborate effectively with others, (3) utilize their abilities to seek and analyze information, and (4) think critically to solve problems and make decisions (Mataheru et al., 2020).

The data analysis technique employed in this study follows the model proposed by Miles, Huberman, and Saldana (Matthew B. Miles, A. Michael Huberman, 2018; Ummu Fauziyyatun Amatullah, 2022).

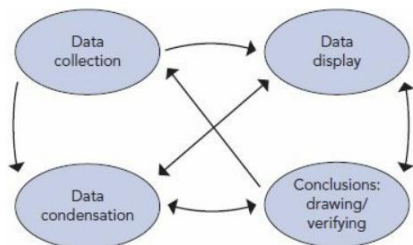


Figure 1:
Data Analysis Techniques by Miles, Huberman, and Saldana

Figure 1 illustrates the data analysis technique using the interactive model. The researcher collected data and then analyzed it through an interactive model comprising three stages: data condensation, data display, and conclusion drawing or data verification. To ensure data validity, the researcher employed data triangulation by cross-checking the information obtained through interviews, observations, and documentation.

RESULTS AND DISCUSSION

Implementation of IPAS Learning at MIN 2 Bantul

Since the 2022/2023 academic year, MIN 2 Bantul has been implementing the new curriculum, albeit not across all classes. In its first year, the independent curriculum was introduced only to grades 1 and 4. In the second year, during the 2023/2024 academic year, the implementation expanded to include grades 2 and 5. According to the principal of MIN 2 Bantul, if everything proceeds according to the planned schedule, the independent curriculum will be fully implemented across all classes and phases by the 2024/2025 academic year, covering grades 1 through 6 and phases A through C.

Teacher NB explained that the implementation of IPAS (Integrated Science and Social Studies) learning aligns with the learning outcomes and objectives, which are not significantly different from the previous science (IPA) and social studies (IPS) curricula. In the independent curriculum, science and social studies are integrated into a single subject now known as IPAS. For instance, in the topic of ecosystem harmony, the learning material combines aspects of both science and social studies. When studying ecosystems, students learn about animal species, their habitats, diets, and distributions within the science component. Concurrently, the social studies component covers topics such as animal habitats, the distribution of flora and fauna, and various landscapes. To provide clarity, the researcher has presented this information in the form of a mind map.

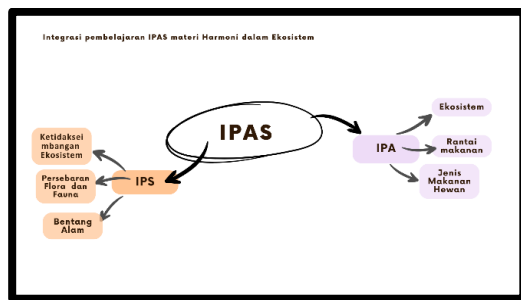


Figure 2:
Implementation of Integrated Science Learning on the Topic of Ecosystem Harmony

“The IPAS (Integrated Science and Social Studies) curriculum in the “Merdeka” (Freedom) curriculum is not significantly different from the Science and Social Studies curriculum in the 2013 curriculum. The content delivered to students is the same; however, it is integrated or combined in its teaching,” explained Mrs. NB (Teacher NB, 2024). The IPAS curriculum in the “Merdeka” curriculum is considered more engaging because its material is varied and requires students to think critically and solve problems. Students find IPAS more appealing as it emphasizes project-based learning. This sentiment is echoed by Teacher NB, who stated, “In the IPAS curriculum under the ‘Merdeka’ framework, children become more active because learning often involves direct practice. They are very enthusiastic about the lessons, and some students are even reluctant to end the sessions despite the schedule being over.”

The IPAS curriculum is indeed intriguing for elementary-level students, especially when it combines critical thinking, problem-solving, direct interaction with the environment, and innovative project-based

learning. This approach provides a new learning experience for students. As Agustina et al. (2022) noted, in the “Merdeka” curriculum, Science is integrated with Social Studies to form IPAS. The IPAS curriculum aims to stimulate interest and curiosity, encourage active participation, develop research skills, foster self-awareness and understanding of the surrounding environment, and enhance comprehension of scientific concepts that expand knowledge and understanding. Other researchers have indicated that the IPAS curriculum content can synergize with entrepreneurship themes in the co-curricular P5 (Project for Strengthening Pancasila Student Profiles) learning modules (Rahmawati et al., 2023).

Science Learning at MIN 2 Bantul from a Constructivist Perspective

Cognitive development refers to the knowledge possessed by children, which includes the ability to think and solve problems. Cognitive skills are one of the aspects assessed in IPAS learning. To enhance critical thinking skills in IPAS subjects, open-ended problems are utilized, representing an application of constructivist theory.

Teacher NB noted that by providing material that allows students to openly discuss problems, students can develop skills to be more creative, easily find solutions, generate fresh ideas, and solve their problems independently. Students can collaborate with their peers to seek solutions to the issues they encounter. According to Piaget, a person’s behavior is influenced by their cognitive aspects, which involve recognizing or contemplating the conditions under which a

behavior occurs. Indirectly, a child's character is shaped through a learning process that involves complex thinking and mental events, which can ultimately drive attitudes and behaviors (Nuryati & Darsinah, 2021).

The approaches used in IPAS learning vary according to the intended learning objectives. In the learning process, Teacher NB frequently employs environment-based learning models and contextual learning models. These models are considered relevant because they help students engage more deeply in the learning process, relate concepts to their everyday lives, and develop an understanding of the relationship between humans and the environment. Through environment-based learning, students can directly observe their surroundings, explore the environment, and create project-based learning experiences. For instance, when studying the causes of ecosystem imbalance, students can practice making volcano replicas and design their volcanoes creatively. Through this project, students learn about natural disasters in social studies and natural features in science.

Research conducted by Deni Okta concluded that the constructivist approach fosters student participation and independence in the Merdeka Curriculum (Okta Nadia et al., 2022). Through the co-curricular P5 learning program, students frequently engage in group activities and tasks, promoting collaboration, cooperation, and communication among peers. This principle of constructivism emphasizes the importance of communicating and working with others. One example of the P5 Project on Pancasila Student Profile Strengthening

was the creation of a traditional Balinese drink, Es Kuwut, under the theme of entrepreneurship. Teacher NB expressed that students are more enthusiastic and enjoy project-based learning.

The third principle of constructivism, which involves seeking and analyzing information, allows students to conduct simple research on local animals and plants. Steps include selecting local animals and plants of interest, gathering information from library books, the internet, or interviews with teachers, and analyzing findings on habitats, diets, life cycles, and the benefits of plants and animals to the environment. Finally, students are asked to create posters to present their knowledge in class.

Teacher NB also utilizes literacy-based assessments. These assessments include stimulus-based questions that test students at all cognitive levels, including reasoning, which is an indicator of higher-order thinking skills (HOTS). Literacy-based assessment questions help teachers identify and differentiate students' abilities. Teachers develop various types of questions aligned with national assessment formats, including short answer, multiple-choice, complex multiple-choice, matching, and true/false questions.

Adopting literacy-based national assessment questions involves testing more than just knowledge; it focuses on competence. Effective questions should combine various learning outcomes, from recalling to implementing, reflecting, and creating, to distinguish students' abilities. Preparing future generations to face globalization challenges requires equipping

students with diverse skills and fostering their development. Students must be accustomed to answering non-routine questions that demand higher-order thinking skills (Firdaus et al., 2023). Ika Kartika's research concluded that STEAM-based learning, incorporating constructivist principles such as real-life problem-solving, inquiry through experiments, and direct interaction with lecturers, provides opportunities for students to acquire new knowledge. The constructivist approach significantly contributes to cognitive development, including activating students, and enhancing communication and collaboration skills (Kartika et al., 2022).

Implementing IPAS Learning from a Constructivist Perspective to Optimize Students' Critical Thinking Skills

Teachers, in achieving desired learning objectives, always employ teaching models that align with the needs and characteristics of their students. Teacher NB noted that in the learning process, 40% of male students in class 5B prefer to learn through movement. These students tend to be active and engage in self-directed play, which hampers their comprehension of the material.

Teacher NB applies a contextual teaching model in IPAS (Integrated Science) learning. This model stimulates students' enthusiasm for learning as they can directly engage with the natural environment and participate in hands-on activities. It connects the subject matter to real-world situations enabling students to understand and apply the knowledge they acquire in contexts relevant to their lives. For example, in a 5th-grade IPAS lesson on animals, plants, and

landscapes, students can interact directly with the environment around their school and their homes.

This teaching model aligns with the constructivist perspective, emphasizing active student involvement in the learning process through direct experience and reflection, leading to deeper and more meaningful understanding. Students actively construct their knowledge through experience and reflection, which encourages them to grasp concepts profoundly.

The implementation of IPAS learning can be achieved through direct observation, collaborative projects, and experiments. In collaborative projects, for instance, students work in groups to identify different ecosystems in their home and school environments. They are tasked with describing the components and balance factors of these ecosystems. The teacher presents a problem regarding factors that can disrupt ecosystem balance. Through these collaborative projects, students identify the causes of ecosystem damage and present their findings in posters displayed in the classroom for an exhibition.

The teacher facilitates the students in organizing an exhibition to serve as a collaborative learning experience. Students are divided into groups with roles as exhibit guides and visitors. The guides explain the content of the posters, while the visitors explore other groups' work and ask questions to deepen their understanding. This approach optimizes students' critical thinking skills, allowing them to independently build their knowledge through critical questioning and problem-solving. This aligns with the findings

of Fitri (2020), which concluded that the constructivist approach is the foundation of contextual learning, where knowledge is gradually built through extensive cognitive processes within relevant contexts. Similarly, Nurhidayati (2017) stated that knowledge acquisition results from cognitive construction through active engagement. Using a constructivist approach, students become more confident and actively participate in expressing their opinions (Muharam et al., 2023).

CONCLUSION

In the IPAS (Integrated Science and Social Studies) learning process under the independent curriculum, teachers implement a constructivist philosophical approach. This approach emphasizes that students come with their own prior knowledge. Constructivism demands that students actively participate, develop independent learning abilities, and construct their own knowledge through activities that are observable, tangible, and experiential. The teacher's role is to serve as a facilitator and advisor, providing reinforcement, feedback, and reflection to enhance and improve students' cognitive abilities.

The independent curriculum has been implemented at MIN 2 Bantul for grades 1, 2, 4, and 5 since 2022. However, IPAS learning is only applied in grades 4 and 5 in accordance with the curriculum structure. The constructivist approach in IPAS learning fosters students' active engagement in enhancing self-constructed knowledge, creates enthusiasm and joy, and optimizes their critical thinking skills in problem-solving

through activities that stimulate creativity and innovation, which is the focus of this research.

This study has limitations in terms of time and research instruments. Future researchers can build on this study by expanding the research instruments to include test sheets, questionnaires, surveys, or observation sheets specific to each student. The duration of the study could also be extended to observe the long-term impact of the constructivist perspective on IPAS learning.

ACKNOWLEDGMENT

The researcher expresses gratitude to all parties who supported the completion of this study, particularly the educational institution MIN 2 Bantul, the principal for granting permission, the grade 5 teachers for providing information, and the grade 5 students who served as a key data source for this research.

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