

The Role of Scientific Approaches in Increasing Creativity and Innovation Through Discovery Learning in Science Learning in Elementary School

Aulia Zahwa Adinda¹, Dinda Kusumawati Subagio², Khairani Ulya³, Miftahul Jannah⁴

^{1,2,3}Elementary School Teacher Education Study Program, University of Lampung.

Author @Khairaniulya20@gmail.com¹, dindakusumawatis@gmail.com², khairaniulya91@gmail.com³, ica061104@gmail.com⁴

ABSTRACT

This study aims to analyze the impact of the implementation of the scientific approach and the Discovery Learning model in learning Natural and Social Sciences (IPAS) at the elementary school level, with a focus on developing students' critical and creative thinking skills. This study was conducted using a literature review method, in which various sources of literature, such as scientific journals, textbooks, and relevant research articles were analyzed in depth. The results of the literature review indicate that the scientific approach, which involves the stages of observing, formulating questions, experiments, analysis, and conclusions, is effective in increasing student engagement in the learning process, and is able to develop critical thinking skills. Meanwhile, the Discovery Learning model that encourages students to find knowledge independently through exploration and direct experience, has been shown to increase students' creativity and their ability to solve problems innovatively. This literature review also revealed that both approaches provide a more meaningful and relevant learning experience, and support the development of 21st century skills, such as critical, creative, collaborative, and communicative thinking. Thus, the implementation of the scientific approach and Discovery Learning in elementary schools is recommended as an effective strategy in optimizing students' intellectual and creative potential.

Keywords: *Scientific Approach, Discovery Learning, IPAS, Elementary School*

A. INTRODUCTION

Creativity and innovation represent two critically significant competencies that are essential for students to cultivate from a very early stage in their educational journey, particularly in the context of the 21st century. In a world characterized by increasingly intricate and dynamic processes of globalization, the capacity to engage in critical thinking, devise effective solutions to complex problems, and generate novel ideas is becoming ever more crucial across a wide array of life's various domains. The continuous evolution of technology necessitates that human beings not only adapt to new circumstances but also proactively develop inventive and imaginative solutions in response to the rapid pace of change that we are witnessing today. Consequently, it is imperative to recognize that education serves as the foundational pillar that equips the younger generation with the necessary skills and knowledge to effectively confront and navigate the multifaceted challenges that lie ahead in the future. In essence, fostering these competencies within educational frameworks is not merely beneficial but rather essential for ensuring that students are adequately prepared to thrive in an increasingly complex world. Ultimately, the role of educational institutions is to nurture and guide students in harnessing their creative potential and innovative capabilities, thereby empowering them to become proactive agents of change in society.

At the elementary school level, the significance of education cannot be overstated, as it plays a crucial role in the development of students' character as well as their fundamental skills, which serve as the foundation for their future learning journeys. Education at this crucial stage is not solely focused on the transfer of knowledge; rather, it aims to cultivate and nurture creative and innovative values that will empower students to think outside the box. An engaging, interactive, and intellectually stimulating learning environment will encourage students to become more active participants in their education and more receptive to exploring a multitude of possibilities when it comes to problem-solving. The incorporation and application of essential competencies, such as collaboration, effective communication, critical thinking, and creativity within the learning process, will

substantially contribute to equipping students with the necessary tools and mindset to navigate and thrive in the challenges that lie ahead in their academic and professional lives. By fostering these skills early on, educators can help ensure that students not only excel in their studies but also develop the resilience and adaptability required to succeed in an ever-evolving world. Ultimately, the holistic approach to education at the elementary level lays a robust groundwork for lifelong learning and personal growth, enabling students to emerge as well-rounded individuals prepared to tackle the complexities of the future.

The Natural and Social Sciences, known as IPAS, represents a significant academic discipline within the curriculum of elementary education, wielding considerable influence over the enhancement of students' creative and innovative capacities. This subject area introduces a rich tapestry of social dynamics, cultural contexts, and environmental issues, all of which serve as invaluable sources of inspiration that can stimulate students to engage in imaginative thinking and devise effective solutions to a myriad of challenges they may encounter. In this context, it is imperative that students go beyond merely absorbing the theoretical concepts presented to them; they are also encouraged to take an active role in the educational experience, engaging with the material in a hands-on and participatory manner. The educational approach that aligns closely with real-life experiences and addresses the pressing issues that students face in their immediate surroundings has the profound ability to expand students' perspectives, thereby equipping them with the critical thinking skills necessary for innovative problem-solving. Furthermore, this engagement not only enriches their understanding of the subject matter but also empowers them to connect theoretical knowledge with practical applications, fostering a deeper comprehension of their social and environmental contexts. Ultimately, by integrating such meaningful learning experiences into the curriculum, educators can cultivate a generation of students who are not only knowledgeable but also adept at approaching problems with creativity and innovation.

Nevertheless, to fully harness and maximize the potential of the Integrated Project-based Approach to Science (IPAS) in fostering and nurturing the creativity and innovation of students, it is essential to implement a meticulously considered and appropriate learning methodology. Among the various pedagogical strategies available, the scientific approach stands out as a particularly effective and beneficial method for enhancing the overall quality of education, particularly within elementary school settings. This specific educational approach actively promotes and encourages students to engage in the learning process in a hands-on manner, which encompasses a series of phases that begin with careful observation, followed by the formulation of questions, the systematic gathering of relevant information, rigorous analysis, and ultimately, the drawing of well-founded conclusions. As a result of this active engagement, students find themselves more deeply immersed in the exploration of knowledge, allowing them to delve into subjects with greater depth and complexity, while simultaneously providing them with valuable opportunities to cultivate and refine their critical thinking abilities. Ultimately, this combination of active involvement and critical analysis equips students with the necessary skills to navigate and interpret the complexities of the world around them, fostering not just academic growth but also personal development. Therefore, it is imperative that educators recognize the importance of employing the scientific approach as a means to optimize the educational experience and outcomes for their students.

Discovery learning, which is fundamentally rooted in a scientific approach to education, creates a rich environment where students are afforded the invaluable opportunity to independently uncover and grasp the intricate concepts they are learning. Through the process of discovery learning, students are not merely passive recipients of information;

rather, they are actively engaged and trained to think critically, creatively, and autonomously as they navigate the complexities of problem-solving in various contexts. This educational model encourages students to embrace the courage to experiment, explore a multitude of diverse approaches, and systematically evaluate the outcomes of their endeavors. Consequently, discovery learning not only significantly enhances students' cognitive capabilities, fostering a deeper understanding of the material, but it also plays an instrumental role in cultivating the essential attitudes and skill sets that are critical for their future achievements in both academic and professional realms. In essence, this approach not only prepares students intellectually but also equips them with the necessary tools to adapt and thrive in an ever-evolving world. Ultimately, the benefits of discovery learning extend far beyond the classroom, influencing students' lifelong learning and personal growth trajectories.

By fostering an environment that encourages the cultivation of creativity and innovation within the classroom setting, students are simultaneously provided with the invaluable opportunity to engage in collaborative efforts, where they can exchange and discuss ideas with their fellow classmates in a productive manner. This process of collaborative learning not only enhances their capacity for critical thinking and innovative problem-solving but also equips them with the essential skills necessary to evolve into responsible individuals who can make meaningful contributions to the betterment of society as a whole. Ultimately, such educational experiences serve to prepare students not merely for academic success, but for their future roles as active and constructive members of their communities.

B. RESEARCH METHODS

This comprehensive study employs the Literature Review methodology, which constitutes a rigorous research approach aimed at systematically identifying, collecting, critically assessing, and meticulously analyzing a diverse range of literature sources that are pertinent to a specific topic of interest. The overarching objective of this research endeavor is to gain a profound understanding of previous scholarly work, to uncover existing gaps in the research literature, and to construct robust theoretical frameworks that can serve as the foundation for new and innovative research initiatives. Furthermore, literature reviews play a pivotal role in evaluating the quality of existing studies and facilitating the comparison of differing perspectives and viewpoints that have emerged from prior research endeavors. By synthesizing these insights, researchers can contribute significantly to the advancement of knowledge within their respective fields.

C. RESULTS AND DISCUSSION

The pedagogical framework that emphasizes a scientific approach within the realm of education is fundamentally aimed at fostering the development of students' abilities in both critical and creative thinking, which is achieved through a meticulously structured learning process that is grounded in scientific methodologies. Within this particular educational paradigm, students are encouraged to move beyond the mere passive absorption of information and instead become actively involved participants in their own educational journey, engaging in a variety of activities that include meticulous observation, the formulation of insightful questions, the execution of experiments, the thorough analysis of gathered data, and ultimately, the synthesis of their findings into coherent conclusions. These carefully articulated steps not only enable students to attain a more profound and nuanced understanding of various concepts but also equip them with the essential skills necessary to tackle problems in a methodical and logical manner, thereby enhancing their overall cognitive abilities and analytical prowess. Consequently, this holistic approach to

learning not only enriches the educational experience for students but also prepares them to face the complexities of real-world challenges with confidence and competence.

According to the insights presented by Nurul (as cited in Johari et al., 2014:12) and referenced in the work of Maryani et al. (2020), the educational methodology characterized by a scientific approach is one that actively engages learners in a direct capacity, not only on an individual basis but also in collaborative settings where group dynamics come into play, thereby harnessing a comprehensive scientific framework for learning. A scientific approach, as defined in the context of educational practices, is an instructional strategy that systematically incorporates specific procedural steps, each of which adheres to established guidelines and protocols throughout the learning experience. Yani (as mentioned in Maryani et al., 2020:125) articulated that the implementation of the scientific approach to learning encompasses a total of five distinct and well-defined stages that educators and learners alike are encouraged to utilize effectively. These stages include the processes of Observing, Asking, Trying, Reasoning, Associating, and ultimately Communicating findings and insights. Throughout these sequential steps, students are invited to immerse themselves in the scientific method, thereby engaging in an active quest for knowledge through the diligent execution of each specified phase. This structured methodology not only fosters critical thinking but also encourages learners to adopt a more inquisitive mindset, ultimately leading to a deeper understanding of the subject matter at hand. By adhering to these outlined steps, learners are equipped to approach problems and inquiries with a systematic lens, thereby enhancing their analytical skills and their ability to articulate their thoughts. Furthermore, the collaborative nature of this approach allows for a rich exchange of ideas and perspectives among peers, which is invaluable in the learning process. In conclusion, the scientific approach to education, as delineated in the aforementioned studies, serves as a pivotal framework for fostering an enriching and engaging learning environment that empowers students to become proactive participants in their own educational journey.

The scientific approach begins by observing the phenomena that are the focus of learning. Through observation, students are invited to pay close attention to the object or event they are studying. From these observations, students then formulate questions that describe their curiosity. These questions are the driving force for the next stage, namely conducting experiments to answer the questions that have been formulated. This experimental process involves testing hypotheses and collecting data, which is then analyzed by students. Through this analysis, they learn to draw conclusions based on the existing evidence, so that the concepts learned are not only memorized but truly understood thoroughly.

The application of the scientific method in educational settings presents a multitude of advantages that significantly enhance the overall learning experience for students. Among the most prominent of these advantages is the notable enhancement of critical thinking capabilities, as students are systematically encouraged to thoroughly assess and evaluate information, actively seek out patterns, and establish meaningful connections between the diverse sets of data they gather throughout their educational journey. Furthermore, this pedagogical approach not only fosters analytical skills but also promotes the cultivation of creativity, as students are consistently invited to engage in innovative thinking when addressing the questions or challenges they encounter in their academic pursuits. Additionally, the scientific approach intricately ties the learning material to real-world contexts, thereby rendering the content more pertinent and impactful for students, who can better appreciate its relevance and practical applications in their everyday lives. This connection to real-life scenarios not only enhances engagement but also facilitates deeper

understanding, as students can relate theoretical concepts to tangible experiences and observations. Moreover, by integrating these methodologies into the learning process, educators can effectively empower students to become more independent thinkers, capable of navigating complex problems with confidence and creativity. Ultimately, the scientific approach serves as a robust framework for fostering a rich and dynamic educational environment that equips learners with essential skills necessary for success in an increasingly complex world.

In educational methodologies that embrace the Discovery Learning model, it is essential to provide students with the autonomy and opportunity to independently delve into and explore knowledge. This approach to Discovery Learning fundamentally positions students as the focal point of the educational process, wherein they are entrusted with the responsibility of unearthing information and comprehending concepts through their own investigative efforts, while educators assume the vital role of facilitators who offer essential guidance and supportive resources. Within the framework of Natural and Social Sciences (IPAS) education, the principles of Discovery Learning can be effectively implemented through a diverse array of interactive and engaging activities that promote hands-on exploration and experiential learning. For instance, students might be presented with the task of identifying pressing environmental challenges, such as the pervasive issue of plastic waste, and subsequently engage in a thorough exploration to devise innovative and practical solutions aimed at addressing this significant problem. This pedagogical approach not only fosters critical thinking and problem-solving skills but also encourages students to take ownership of their learning journey, thereby enhancing their overall educational experience. Ultimately, the integration of Discovery Learning within the curriculum serves to cultivate a deeper understanding of complex scientific and social phenomena, empowering students to become proactive and informed citizens in an increasingly interconnected world.

Discovery Learning encompasses a comprehensive exploratory process wherein students actively engage in seeking out information from a diverse array of sources, which may include traditional printed materials such as books, digital resources available on the internet, or even practical field experiments that facilitate hands-on learning. Upon gathering pertinent information, students are encouraged to undertake experimental activities that allow them to rigorously test the ideas or hypotheses they have formulated independently, utilizing their critical thinking skills to navigate through the complexities of the subject matter. This immersive, hands-on experience significantly enriches their understanding of the material being studied, fostering a more profound connection to the concepts at hand than would be achieved through passive learning methods. Following the completion of their experiments, students are provided with the opportunity to engage in thoughtful discussions and reflections on their findings, facilitating a collaborative environment where insights and perspectives can be shared among peers. This reflective phase culminates in the reinforcement and clarification of key concepts by the teacher, who plays a vital role in guiding students through their learning journey. Such a structured process not only ensures that students actively discover new knowledge, but also allows them to comprehend it within a broader and more meaningful context that enhances their overall educational experience. Ultimately, this approach to learning underscores the importance of inquiry-based education in shaping well-rounded, knowledgeable individuals who are equipped to tackle real-world challenges.

The implementation of Discovery Learning within the realm of social studies education presents a multitude of advantages that can significantly enhance the learning experience for students. To begin with, Discovery Learning fosters a deeper and more nuanced

understanding of various concepts among students, as they engage in the process of uncovering these concepts on their own, which leads to a more personal and meaningful connection with the material. Furthermore, this pedagogical approach not only stimulates but also encourages students to engage in creative and innovative thought processes as they actively seek out solutions to the challenges and problems they encounter during their learning journey. In addition, the application of Discovery Learning has been shown to markedly increase students' intrinsic motivation to engage with the subject matter, primarily because they perceive the tasks as both challenging and rewarding, which in turn makes them feel more involved and invested in their educational pursuits. Lastly, this method promotes a more active form of learning, wherein students take charge of their educational experiences, thereby cultivating a sense of ownership and responsibility towards their academic development, which is crucial in today's rapidly evolving educational landscape. Overall, the myriad benefits of integrating Discovery Learning into social studies not only enhance the educational experience but also empower students to become more effective and independent learners.

Overall, the implementation of a scientific methodology in conjunction with the principles of Discovery Learning has the potential to significantly enhance the critical and creative thinking abilities of students, thereby fostering a more profound and robust intellectual engagement. Extensive research has consistently demonstrated that students who actively participate in discovery-based learning experiences exhibit a heightened capacity for creatively addressing complex problems and engaging in analytical thought processes, which are essential skills in today's rapidly evolving world. Furthermore, these students tend to develop a greater degree of independence in their educational journeys, as they become accustomed to navigating their own avenues of exploration and making informed decisions based on their findings.

In the scholarly work of Hosnan, as referenced by Prasetyo and Kristin in their 2020 publication on page 282, it is articulated that the Discovery Learning model is fundamentally a pedagogical framework that necessitates a high level of student engagement and activity in the learning process, compelling them to actively seek out and investigate potential solutions to various problems. This active engagement not only contributes to a deeper understanding of the subject matter but also ensures that the knowledge acquired through such processes remains firmly etched in the students' long-term memory, thereby enhancing their overall learning experience and retention of information.

The utilization of scientific methodologies combined with Discovery Learning strategies plays a pivotal role in the enhancement and cultivation of essential 21st-century skills, which encompass critical, creative, collaborative, and communicative thinking, often referred to as the 4C skills framework. Through this comprehensive educational approach, students are not only equipped with the knowledge necessary to grasp and comprehend the subject matter at hand, but they are also trained to become adaptable and innovative thinkers, capable of navigating and overcoming the multifaceted challenges that they will encounter in the real world. The implementation of such educational strategies within the context of Integrated Science and Technology learning, particularly at the elementary school level, has a profound and transformative effect on the development of students, fostering individuals who exhibit heightened levels of critical thinking, creativity, and preparedness to engage with the dynamic changes occurring on a global scale. Ultimately, this integration of contemporary learning methodologies serves to produce a generation of learners who are not only knowledgeable but also empowered to thrive in an increasingly complex and interconnected world.

D. CONCLUSION

The scientific approach, in conjunction with the Discovery Learning model, represents two highly effective pedagogical strategies aimed at enhancing the critical and creative thinking abilities of students, particularly within the educational domains of Natural and Social Sciences, commonly referred to as IPAS learning. By placing a strong emphasis on the essential processes of meticulous observation, thorough exploration, systematic experimentation, and thoughtful reflection, these two methodologies actively motivate students to engage in their learning experiences in a dynamic and participatory manner.

In this educational framework, students are not relegated to the passive reception of information, but rather are proactively invited to embark on a journey of inquiry where they can search for, discover, and independently comprehend knowledge. This engaging approach not only facilitates a profound understanding of core concepts but also serves to sharpen the students' capacity to think innovatively and to creatively tackle complex problems that they may encounter in various contexts.

The application of these two approaches is expected to increase learning motivation and make the learning process more relevant to daily life. Thus, students who engage in learning based on scientific approaches and *Discovery Learning* will be better prepared to face real-world challenges and contribute positively in society.

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