www.bircu-journal.com/index.php/birci
Budapest International Research and Critics Institute-Journal (BIRCI-Journal)
Humanities and Social Sciences
ISSN 2615-3076 Online)
ISSN 2615-1715 (Print)
Budapest Institute

Implementation and Challenges of Discovery-Based Science Learning: Assessment and Evaluation at Lentera Harapan Elementary School

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Abstract

Discovery-based science learning at Lentera Harapan Elementary School has become the main focus in efforts to improve students' understanding of science concepts and critical thinking skills. This study uses a descriptive qualitative approach to explore the implementation of discovery-based science learning at Lentera Harapan Elementary School. Through in-depth interviews with science teachers and classroom observations, we investigated teacher preparation, available resources, challenges faced, and strategies used in implementing discovery-based science learning. The results of this study indicate that in-depth teacher preparation of scientific methods and active learning skills is the key to successful implementation. However, limited resources and time in the curriculum are the main challenges. Holistic and formative assessment is also recognized as an important element in evaluating student progressat Lentera Harapan Elementary School. These findings provide valuable insight into best practices in implementing discovery-based science learning at Lentera Harapan Elementary School.

Keywords
Implementation; challenge; discovery-based science learning

I. Introduction

Education has a very decisive plan for individual development and self-realization, especially for the development of the nation and state. The progress of a culture depends on the way that culture recognizes, appreciates and utilizes human resources and this is closely related to the quality of education provided to students by members of its society. Discovery-based science learning has been recognized as an effective method in improving students' conceptual understanding and critical thinking skills. In this approach, students are encouraged to become active inventors, researchers and problem solvers in the learning process. However, despite its clear benefits, there are a number of challenges that arise in assessing and evaluating discovery-based science learning. (Nurjannah, 2015)

One of the main challenges faced by educators in assessing and evaluating discovery-based science learning is the ability to accurately measure students' deep conceptual understanding and critical thinking skills. Traditional approaches to assessment, particularly those focused on written tests, are often insufficient to provide a comprehensive picture of student abilities in the context of discovery-based science learning.

In general, written tests tend to examine passive mastery of facts and concepts, with an emphasis on engagement with the information presented in textbooks or other learning materials. However, in discovery-based science learning, students are encouraged to be

DOI: *https://doi.org/10.33258/birci.v7i2.7903*

active in exploring, experimenting, and discovering new knowledge through an involved discovery process.

Critical thinking skills, such as the ability to ask questions, analyze data, summarize, and draw conclusions, are also often not adequately measured through traditional evaluation methods. In fact, these skills are an important aspect of discovery-based science learning, where students are required to think analytically and take logical steps in their research process.

Thus, although written tests may provide a general picture of students' conceptual understanding and knowledge, they often fail to capture important dimensions of discovery-based science learning, including students' ability to apply their knowledge in relevant contexts and think critically in solving problems.

Therefore, educators need to look for a more holistic and contextual evaluation approach in assessing discovery-based science learning. This may involve the use of a variety of assessment instruments, including discovery-based projects, student portfolios, oral presentations, or group discussions, which allow students to demonstrate their understanding in a more dynamic and relevant way. Additionally, end-result-oriented assessments often do not reflect actual learning process. It is important to not only evaluate the final product of a student's discovery project, but also their journey in discovering, researching, and developing their understanding of a particular science topic.

Other challenges include the need for assessment instruments that are compatible with discovery-based science learning approaches, as well as teacher involvement in providing in-depth and meaningful feedback to students.

In facing these challenges, it is important for educators and researchers in the field of science education to look for innovative and targeted solutions. Improving assessment instruments that cover various aspects of conceptual understanding and critical thinking skills, as well as formative evaluation approaches that are integrated into the learning process, can help increase the effectiveness of discovery-based science learning.

By addressing these challenges, discovery-based science learning can become more inclusive, enabling every student to develop a deep understanding of science and the scientific thinking skills necessary for success in the 21st century.

Based on the background above, the author is interested in analyzing how to overcome challenges in assessing and evaluating discovery-based science learning at Lentera Harapan Elementary School. So the author hopes that this research can be a solution in overcoming current challenges.

II. Review of Literature

2.1 Discovery Based Science Learning (Discovery Learning)

Learning by discovery (Discovery Learning) is an important component in the constructivist approach which has a long history in the world of education. The idea of discovery learning emerged from the desire to give students a sense of pleasure in "discovering" something on their own, by following in the footsteps of scientists (Nur, 2005).

The discovery learning method is a learning method that involves students being active in the ongoing learning process and gives students full opportunities to learn to find information and knowledge independently. The knowledge gained by discovery learning will last a long time because students learn to find information according to their own experiences. Discovery learning is also a learning model to condition students to become accustomed to finding, searching and discussing all information related to the lesson.

Discovery is finding a concept through a series of data or information obtained through observation or experimentation. Discovery is often applied in laboratory science experiments that still require teacher assistance, which is called guided discovery. Guided discovery is a method used to build concepts under teacher supervision. Discovery learning is a cognitive learning method that requires teachers to be more creative in creating situations that can make students learn actively to discover their own knowledge. This learning method is in accordance with Bruner's theory which suggests that students learn actively to build concepts and principles. Discovery activities through experimental activities can increase students' knowledge and skills simultaneously. (Ridwan Abdullah Sani, 2015)

According to Sund, discovery is a mental process where students are able to assimilate a concept or principle. These mental processes include observing, digesting, understanding, classifying, making guesses, explaining, measuring, making conclusions and so on. For example, a concept is: triangle, heat, democracy and so on, while what is meant by principle includes, among other things, metal when heated it will expand. In this technique, students are left to discover or experience the mental process themselves, the teacher only guides and provides instructions.

III. Research Method

The research method used in this paper is a descriptive qualitative method. In understanding and explaining phenomena in a deeper and more complex context. This approach emphasizes the interpretation, meaning and subjective experiences of individuals or groups used in this research to gain an in-depth understanding of implementation and challenges indiscovery-based science learning.The subjects of this research include science subject teachers at Lentera Harapan Elementary School who have relevant experience and understandingdiscovery-based science learning.The qualitative research method in this study is expected to provide an in-depth picture of implementation and challengesdiscovery-based science learning at Lentera Harapan Elementary School. It is hoped that the results of this research can contribute to the development and improvement of the learning process, provide guidance for teachers and policy makers.

IV. Result and Discussion

4.1 Learning ImplementationDiscovery Based Science

Implementation is the execution of policies, programs, or plans into real action. Specifically, implementation involves the process of turning an idea or concept into daily practice. This process involves a series of steps to ensure that what has been planned or decided is actually carried out. This includes assigning responsibilities, allocating resources, organizing and organizing tasks, and monitoring progress and results. To achieve successful implementation, a clear understanding of the tasks to be performed is essential, as well as adequate support from all relevant parties and effective communication between them. Good coordination, appropriate training, and ongoing supervision are also important factors in maintaining smooth implementation.

Discovery-based science learning is an approach to teaching science that emphasizes the process of discovery and experimentation by students. In contrast to traditional teaching methods where teachers transmit information to students, discovery-based learning places students as active agents in their own learning.

Discovery-based science learning not only teaches students scientific facts, but also empowers them to become critical thinkers, informed decision makers, and lifelong learners in the field of science. This method promotes curiosity, the courage to try, and the ability to master scientific knowledge independently.

Discovery-based science learning has a number of significant benefits for students at Lentera Harapan Elementary School. Here are some of the main benefits:

1. Development of Critical Thinking Skills

Developing critical thinking skills in discovery-based science learning is very important because it helps students to ask deep questions, analyze evidence critically, use data effectively, make logical conclusions, solve problems in a systematic way, and reflect on their own thinking processes. These skills are not only useful in academic contexts, but also in everyday life, helping students become independent learners, analytical thinkers, and informed decision makers.

2. Improvement of Science Process Skills

Improving science process skills in discovery-based science learning includes a series of activities that involve students directly in scientific exploration. This includes the ability to observe natural phenomena carefully, plan experiments carefully to test hypotheses, collect data systematically using appropriate tools and techniques, analyze data to identify patterns or relationships, and conclude findings based on existing evidence. Students also learn to construct scientific arguments supported by evidence, communicate experimental results clearly and precisely, and reflect on their processes to increase their understanding of the scientific method and the science concepts they learn. Thus, improving science process skills not only increases students' ability to understand and apply scientific concepts, but also prepares them to become independent and critical thinking scientists.

3. Increased Understanding of Science Concepts

Increasing understanding of science concepts in discovery-based science learning involves an active process where students not only learn these concepts, but also experience and apply them directly. Through exploration, experimentation, and discovery, students are given the opportunity to deepen their understanding of science principles and how these concepts operate in real contexts. They not only remember science facts, but also understand the theoretical foundations behind them, see the relationships between different concepts, and identify practical applications of those concepts in everyday life. Thus, discovery-based science learning helps students to gain a deep and meaningful understanding of science, which goes beyond simply memorizing information for tests and encourages them to become independent, critical-thinking learners in science. Increased Interest and Motivation: Discovery-based science learning is often more engaging for students because it offers hands-on experience and active exploration. This can increase students' interest and motivation to study science and encourage them to pursue careers in science or technology.

4. Strengthening Collaborative Skills

Strengthening collaborative skills in discovery-based science learning refers to students' ability to work together effectively in groups to achieve learning goals. Through collaboration, students learn to share ideas, exchange information, and solve problems together. They develop interpersonal communication skills, such as listening

empathetically, providing constructive feedback, and articulating their ideas clearly. Additionally, students learn to appreciate the contributions of each group member, respect differences of opinion, and work toward consensus. This collaborative process not only broadens students' understanding of the subject matter, but also prepares them to become active participating members of society, capable of working in cross-cultural and interdisciplinary teams to solve complex problems in the real world.

5. Student Empowerment

Student empowerment in discovery-based science learning is a process where students are given responsibility and active involvement in their own learning. This involves giving students control over their learning process, allowing them to make decisions, manage their time, and determine the direction of their own learning. In the context of science, empowering students allows them to become independent researchers, explore science topics that interest them, and lead their own experiments or research. Through this process, students learn to take initiative, develop a sense of responsibility for their learning, and gain confidence in their ability to investigate the world around them. Empowering students also promotes independence and creativity, and prepares them to become active and proactive lifelong learners in science and in other contexts of their lives.

6. Relevance to Social and Environmental Context

The relevance of social and environmental contexts in discovery-based science learning emphasizes the importance of linking science concepts to relevant issues in society and the environment around students. It allows students to understand how science is applied in everyday life and how scientific decisions affect society and the environment. Through this approach, students can identify and explore real challenges such as climate change, environmental crises, or public health, and consider possible scientific solutions. By understanding the link between science and the socio-environmental context, students also learn to appreciate the importance of scientific ethics, sustainability, and social responsibility in science decision making. This helps them to develop a deeper understanding of the role of science in society and increases their engagement in complex global issues.

Overall, discovery-based science learning provides a deep, relevant, and motivating learning experience for high school students. This not only prepares them to understand a scientifically complex world, but also to become critical and innovative lifelong learners.

4.3 Challenges of Discovery-Based Science Learning

Although discovery-based science learning at Lentera Harapan Elementary School has many benefits, there are several challenges that can be faced in implementing it:

1. Teacher Preparation

Teacher preparation in the context of discovery-based science learning includes various aspects that include a deep understanding of the scientific method, skills in designing and implementing discovery activities, and the ability to facilitate student learning effectively. Teachers need to have a strong understanding of the science concepts being taught, as well as the ability to relate these concepts to real-world contexts. They must also be skilled in selecting and designing discovery activities that are relevant and interesting for students, and have skills in providing the necessary direction and support to students throughout the discovery process. Apart from that, teachers also need to have the ability to manage the class effectively, facilitate discussions, and motivate students to be

actively involved in their learning. Teacher preparation in this regard can involve ongoing professional training and development, collaboration with colleagues, and ongoing research and reflection on their teaching practices.

2. Resource

Resources are an important aspect of discovery-based science learning, but are often a challenge due to lack of access to laboratory equipment, experimental materials, and supporting technology in many schools. These limited resources can hinder teachers' ability to provide rich and deep learning experiences to students. Solutions to this challenge include efforts to increase access to resources, such as through the procurement of cheap and simple laboratory equipment, learning approaches that rely on everyday materials that are easy to find, and the use of digital technology to support experiments and simulations. Additionally, collaboration with outside institutions, including universities, industry, and non-profit organizations, can also assist in expanding access to resources and supporting discovery-based science learning.

3. Time and Curriculum

Challenges related to time and curriculum in the context of discovery-based science learning often arise because this method requires more time for exploration and discovery. In many schools, dense curricula and limited learning time can be obstacles to providing adequate opportunities for students to engage in the process of discovery in depth. The solution involves restructuring the curriculum to provide greater space for discovery-based science learning, reducing less relevant material, and integrating this approach into a variety of subjects to improve time efficiency. Thus, teachers need to be creative in planning and structuring lessons that adapt to the existing curriculum, while still providing opportunities for students to carry out in-depth scientific exploration and gain a more comprehensive understanding of scientific concepts.

4. Evaluation

Assessment in the context of discovery-based science learning requires a more holistic and contextual approach. The main challenge is to assess students' science process skills, conceptual understanding, and critical thinking abilities as a whole. This requires the development of appropriate assessment instruments, such as clear rubrics and measurable criteria, that enable teachers to evaluate various aspects of student performance. In addition, assessment should cover not only the final results, but also the student's learning process, including participation in experiments, collaboration in groups, and reflection on learning. A formative approach is also important, where teachers provide ongoing feedback to students to help them improve their understanding and skills throughout the learning process. In addition, assessments should also reflect scientific values such as cooperation, honesty and scientific responsibility, which are an integral part of discovery-based science learning.

By recognizing these challenges and taking appropriate steps to overcome them, discovery-based science learning can become more effective and beneficial for students in the development of a deep understanding of science and critical thinking skills.

4.3 Assessment and Evaluation of Discovery-Based Science Learning

Assessment and evaluation of discovery-based science learning at Lentera Harapan Elementary School requires a different approach from traditional assessment methods because it emphasizes the students' learning process at Lentera Harapan Elementary School

and their understanding of science concepts. This approach prioritizes continuous formative assessment to monitor student progress throughout the learning process, rather than just focusing on the final result. The assessment instruments used must reflect students' science process skills, conceptual understanding and critical thinking abilities. Clear rubrics and measurable criteria need to be developed to evaluate various aspects of student performance fairly and objectively. Additionally, it is important to involve students in their own assessment process, encouraging them to reflect on their learning and identify areas for improvement. Evaluations should also include social and collaborative aspects of learning, such as students' ability to work in teams and communicate well. With this holistic and comprehensive approach to assessment, discovery-based science learning can be evaluated effectively, providing an accurate picture of student progress and providing valuable feedback to improve the quality of future learning.

V. Conclusion

Implementation of discovery-based science learning involves a complex process of turning ideas or concepts into real actions in a learning context. This requires in-depth teacher preparation, provision of adequate resources, and restructuring of the curriculum to make room for more discovery-oriented learning. The main challenges in implementing discovery-based science learning at Lentera Harapan Elementary School include adequate teacher preparation, limited resources, time restrictions in the curriculum, and assessment that is in accordance with a holistic learning approach. To overcome these challenges, collaborative efforts are needed between teachers, schools and other related parties. Teachers need to continue to improve their skills in designing and implementing discovery-based learning, while schools and related parties need to provide support in the form of resources and training.

Assessment and evaluation of discovery-based science learning at Lentera Harapan Elementary School requires a different approach from traditional assessment methods. This involves developing assessment instruments that reflect students' science process skills, conceptual understanding, and critical thinking abilities. Additionally, involving students in their own assessment process is also important to improve their understanding of learning and provide valuable feedback. By overcoming these challenges and implementing a holistic assessment approach, discovery-based science learning at Lentera Harapan Elementary School can provide deep and meaningful learning experiences for students, preparing them to become independent, critical and innovative learners in the field of science.

References

Firda, A., & Suharni, S. (2022). Tingkat Kemampuan Literasi Sains Guru Pendidikan Anak Usia Dini. Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini, 6(5), 3868– 3876. https://doi.org/10.31004/obsesi.v6i5.1928.

Jamil Suprihatiningrum, (2016). Strategi Pembelajaran, (Yogyakarta : Ar-Ruzz Media), 241.

Kirom, Askhabul. (2017). Peran Guru dan Peserta Didik dalam Proses Pembelajaran Berbasis Multikultural. Jurnal Yudharta. 3(1). https://jurnal.yudharta.ac.id/v2/index.php/pai/article/view/893/762.

Laia, N., & Sarumaha, S. (2022). Penerapan Strategi Pembelajaran Peningkatan

Kemampuan Berpikir (Sppkb) Untuk Meningkatkan Hasil Belajar Siswa pada Mata Pelajaran Pendidikan Kewarganegaraan di Kelas VIII SMP Swasta Fajarmas Bawona'uru Tahun Pembelajaran 2021/2022. 3(1). https://jurnal.uniraya.ac.id/index.php/JPKn/article/view/338.

Nur, Muhammad. (2005). Pembelajaran Kooperatif. JawaTimur :Depdiknas

Nurjannah, (2015). Upaya-Upaya Yang Di Lakukan Guru Untuk Meningkatkan Hasil Belajar Pada Pembelajaran Sains Di Min Buengcala Kuta Baro Aceh Besar. Jurnal Tunas Bangsa

Putra, Hadi Hamzah. (2016). Analisis Kemampuan Literasi Sains SMP Kelas VII Kurikulum 2013 di Kota Padang. Skripsi. Padang: Universitas Negeri Padang.

Ridwan Abdullah Sani, (2013). Pembelajaran Saintifik untuk Implementasi Kurikulum, (Jakarta : PT Bumi Aksara, 2015) , 97.

Sukardi. (2008). Evaluasi Pendidikan Prinsip dan Operasionalnya. Jakarta: Bumi Aksara

Yuliati, Y. (2017). Literasi sains dalam pembelajaran IPA. Jurnal Cakrawala Pendas, 3(2), 21–28