



Analysis of the Implementation of Scientific Approach Learning Strategies in Elementary Schools in Palembang

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Abstract

This study aims to determine the Analysis of the Implementation of Scientific-Based Learning Strategies (Scientific Approach) in SD Negeri 160 Palembang. This study will be conducted with a qualitative approach with a phenomenological research type using a descriptive design that aims to describe phenomena or events in class VA at SD Negeri 160 Palembang. Data collection techniques include observation, interviews, and documentation. Data validity testing is carried out by triangulation of data sources and triangulation techniques. Data are analyzed by means of data reduction, data presentation, and verification or drawing conclusions. The results of this study indicate that the application of scientific-based learning strategies (Scientific Approach) in SD Negeri 160 Palembang in the subject of Science on the Ecosystem material, this strategy is very suitable to be applied because students can think critically, analytically, and creatively at school in implementing the application of scientific-based learning strategies in class VA and can show an increase in the development of students in understanding skills in learning which can be seen from the mapping table of student development in class VA, namely by implementing the 5 M stages, namely: Observing, Asking, Exploring, Associating, and Communicating. Factors that support the application of scientific-based learning strategies are the availability of learning media facilities, other supporting factors include the principal, teachers, and parents and the inhibiting factor is the very limited time element.

Keywords: Analysis of Implementation; Learning Strategy; Scientific Based; Students

Abstrak

Penelitian ini bertujuan untuk mengetahui Analisis Penerapan Strategi Pembelajaran Berbasis Sainifik (Scientific Approach) di SD Negeri 160 Palembang. Pada penelitian ini akan dilakukan dengan pendekatan kualitatif dengan jenis penelitian fenomenologi yang menggunakan rancangan deskriptif yang bertujuan untuk menggambarkan fenomena atau peristiwa dikelas VA di SD Negeri 160 Palembang. Teknik pengumpulan data meliputi observasi, wawancara, dan dokumentasi. Uji keabsahan data dilakukan dengan triangulasi sumber data dan triangulasi teknik. Data dianalisis dengan cara reduksi data, penyajian data, dan verifikasi atau penarikan kesimpulan. Hasil dari penelitian ini menunjukkan bahwa penerapan strategi pembelajaran berbasis saintifik (Scientific Approach) di SD Negeri 160 Palembang dalam mata pelajaran IPAS pada materi Ekosistem strategi ini sudah sangat cocok diterapkan karena siswa dapat berpikir kritis, analitis, dan kreatif disekolah dalam menerapkan penerapan strategi pembelajaran berbasis saintifik dikelas VA dan dapat menunjukkan peningkatan

perkebangan peserta didik dalam memahami keterampilan dalam pembelajaran yang dapat dilihat dari tabel pemetaan perkembangan peserta didik dikelas VA yaitu dengan menerapkan tahapan 5 M yaitu dengan mengamati, menanya, mengeksplorasi, mengasosiasi, dan mengomunikasikan. Faktor yang menjadi pendukung dalam penerapan strategi pembelajaran berbasis saintifik ketersediaan fasilitas media pembelajaran faktor pendukung lainnya meliputi kepala sekolah, guru, dan orang tua dan faktor yang menjadi penghambat yaitu pada elemen waktu yang sangat terbatas.

Kata kunci: Analisis Penerapan; Berbasis Saintifik; Peserta Didik; Strategi pembelajaran

INTRODUCTION

Learning is a natural activity that can occur in every individual, where they experience change or improvement, both in cognitive and motor aspects, through student interaction. Learning is a process of interaction between teachers, students, and learning resources in a learning environment. Learning functions as a learning process provided by teachers to enable students to acquire knowledge and skills, and to better master skills and habits, resulting in good attitudes and self-confidence. Learning is a planned effort to manipulate learning resources to become a learning process within learners. Thus, in the learning process that aims to help learners study effectively, learning and the learning process are forms of interaction between teachers and learners in their environment with mental activities carried out by each individual so that their behavior changes before and after learning.

According to Thursan Hakim, learning is a process of change in a person that is reflected in improvements in attitude, knowledge, skills, habits, understanding, thinking skills, and other attitudes. In this interaction, teachers act as facilitators. As facilitators, teachers need to have the right strategies so that students can learn in an active, effective, and efficient manner, in accordance with the objectives to be achieved. This can be done by implementing learning strategies.

Strategies in learning can guide the teaching and learning process, because strategies are a key component in the learning process. Learning strategies can also be understood as concrete efforts that educators can make in the learning process that are considered more effective and efficient, or as tactics and techniques that are applied. Learning strategies are strategies used in learning, such as discussions, observations, and question and answer sessions, as well as other activities that can encourage the development of student competencies. In learning, the most important task of teachers is to create an environment that supports behavioral change in students. Teachers at school can apply various effective learning strategies in the teaching and learning process in the classroom. According to Kemp, learning is a learning activity that must be carried out by teachers and students so that learning objectives can be achieved effectively and efficiently.

Several previous studies have shown that the application of the scientific approach has a positive impact on student learning outcomes. Machin's (2014) research found that the implementation of the scientific approach can significantly improve student learning outcomes. However, this study has not explored in depth

how each stage in the scientific approach contributes to the development of students' critical thinking skills.

Daryanto (2014) stated in his research that the scientific approach is effective in increasing student learning motivation, but he did not analyze the supporting and inhibiting factors in its implementation at the elementary school level. Meanwhile, international research by Bybee et al. (2006) on inquiry-based learning showed positive results in the development of student science literacy, but the research context was conducted in developed countries with adequate facilities.

The identified research gap is the lack of research that comprehensively analyzes the implementation of scientific-based learning strategies in elementary schools, taking into account the local context in Indonesia, particularly regarding the supporting and inhibiting factors in its application. This study attempts to fill this gap by thoroughly analyzing the application of scientific-based learning strategies at SD Negeri 160 Palembang, including the stages of implementation, learning outcomes, and factors that influence its success.

Many facts from previous studies prove that learning processes that are not relevant to student characteristics can hinder their understanding and interest in learning. Students who are less active and creative during learning activities will have an impact on the quality of learning achievement (Toyiba & Nurdyansyah, 2018). Therefore, the use of scientific-based learning strategies can attract teachers to use this strategy because the implementation of scientific-based learning strategies has advantages, namely, it can develop students to be more active and creative in the learning process, as well as improve students' critical thinking skills and help students increase their sensitivity to issues in their surroundings (Hosnan, 2014).

The results of field observations conducted by researchers on the teaching and learning process in class VA at SD Negeri 160 Palembang show that the school has been using the Merdeka Curriculum and implementing a scientific-based learning strategy since the 2013 curriculum was introduced. Based on field observations, this strategy is still being used in class VA and is very suitable because it encourages students to be creative and active in learning activities. In this subject, the researcher will look further at the development of students in class V, more precisely in class VA in the odd semester, which consists of 34 students, in the teaching and learning process by applying the Scientific-Based Learning Strategy at SD Negeri 160 Palembang.

Based on previous research, the researcher observed that from the various learning models used, teachers strongly supported the application of the scientific method, namely by using the scientific approach model. In selecting learning experts, the field or area of expertise of the topic used was also considered to assist in applying the Scientific Approach learning method. The results of this study show that there are measurable problems in the level of understanding among students in science learning, namely in applying the scientific approach

learning strategy in the Merdeka Curriculum after implementing the steps of the 5M scientific approach learning: Observing, Questioning, Exploring, Analyzing, and Communicating.

Based on the background and previous research presented by the researcher above, the researcher is interested in conducting further research on the Analysis of the Application of Scientific Approach Learning Strategies at SD Negeri 160 Palembang.

METHOD

This study uses a qualitative approach with a descriptive phenomenological research design. According to Creswell (2015), phenomenological research aims to describe the meaning of experiences of several individuals regarding a concept or phenomenon. A qualitative approach was chosen because this study seeks to understand the phenomenon of learning in depth from the perspective of educational practitioners (Sugiyono, 2017). Descriptive research aims to present the object being studied objectively and to describe facts or phenomena systematically with accurate characteristics and frequencies (Moleong, 2014). In qualitative research, the research process is considered more important than the results obtained because the focus is on a deep understanding of the phenomena that occur (Bogdan & Biklen, 2007).

This study was conducted at SD Negeri 160 Palembang, focusing on students and teachers in class VA. The research subjects included the principal, teachers/homeroom teachers of class VA, and two students of class VA who were selected using purposive sampling based on specific criteria. According to Miles and Huberman (2014), purposive sampling allows researchers to select participants who can provide rich information about the phenomenon being studied. The data collection techniques in this study included: Participatory Observation, In-depth Interviews, and Documentation. The analysis technique used the Miles and Huberman (2014) model, which consists of three stages: Data Reduction, Data Presentation, and Drawing Conclusions. Data validity testing was carried out through Source Triangulation and Technique Triangulation.

RESULTS AND DISCUSSION

The Concept of Scientific-Based Learning Strategies

According to Sani (2019), scientific learning is learning with a scientific approach in a subject that gives rise to scientific-based learning strategies. The scientific approach is emphasized or reinforced when conducting core learning activities in the knowledge aspect. In applying the scientific approach, teachers function as facilitators and motivators for students, so teachers must understand and master these scientific strategies (Hosnan, 2014).

International research by Bybee et al. (2006) shows that a scientific inquiry-based learning approach can significantly improve students' science literacy. Similarly, Krajcik and Shin (2014) emphasize in their study the importance of authentic science practices in learning to develop students' conceptual understanding and procedural skills.

Learning strategies refer to the approaches or methods applied by teachers to plan, manage, and implement learning activities aimed at helping students master the expected knowledge, skills, and attitudes (Sunhaji, 2012). These strategies not only include teaching techniques, but also aspects of planning, approaches taken, and the selection of tools and media that are appropriate to the characteristics of the material and the needs of the students (Daryanto, 2014).

Before implementing scientific-based learning strategies, teachers prepare learning tools in the form of teaching modules that serve as a reference during learning activities so that learning runs effectively and efficiently. This is in line with Machin's (2014) research, which states that careful learning planning is the key to the successful implementation of the scientific approach.

Teachers also prepare learning media in the form of images and videos that are relevant to the material to be discussed. According to Mayer (2014), the use of multimedia in learning can improve students' retention and understanding of the material being studied. Learning activities regarding the role of teachers in implementing scientific-based learning strategies require careful planning and implementation.

The results of research in class VA of SD Negeri 160 Palembang show that in this school year, the curriculum used is the Merdeka Curriculum. In the IPAS teaching module, science-based learning is still used because the main objective is not only for students to obtain information but also to improve their critical, analytical, and creative thinking skills (Hosnan, 2014).

Based on the applicable curriculum, the material used in the implementation of scientific-based learning strategies is IPAS Chapter II Phase C: Eating and Being Eaten, with a focus on observing the relationship between living things in an ecosystem in the form of a food chain. The selection of this material is in accordance with the characteristics of the scientific approach, which emphasizes the observation of real phenomena and scientific investigation (National Research Council, 2012).

SD Negeri 160 Palembang has implemented the Merdeka Curriculum for the past two years and has been conducting scientific-based learning since the 2013 Curriculum era. The goal is to ensure that learning objectives are achieved and that students not only gain knowledge but also develop critical, analytical, and creative thinking skills. Researchers observed that teachers applied scientific-based strategies using the 5M steps (Observing, Questioning, Exploring, Associating, Communicating) in core learning activities.

Observing

Based on the research results, the VA class teacher consistently used learning media in the form of images and videos relevant to the material during theoretical learning in the classroom. In the observation activity, the teacher provided ample and varied

opportunities for students to make observations through activities such as seeing, listening, hearing, and reading (Hosnan, 2014).

The observation stage in the scientific strategy aims to attract students' attention and ensure they remain focused on learning, especially on ecosystem material. One way to do this is to start the lesson using interesting visual media, such as pictures, videos, or simulations of food chains in ecosystems. Research by Marzano et al. (2001) shows that the use of advance organizers in visual form can increase students' attention and understanding.

Questioning

Questioning activities give students the opportunity to ask questions about what they have seen, listened to, read, or observed. Teachers should help students ask questions about the results of their observations, from concrete to abstract objects (Sani, 2019). Questioning activities foster students' curiosity and develop higher-order thinking skills (Anderson & Krathwohl, 2001).

Teachers in class VA of SD Negeri 160 Palembang used the questioning strategy in the ecosystem material to stimulate students' critical thinking skills. Effective questioning techniques, as stated by Walsh and Sattes (2015), include open-ended questions that encourage students to think more deeply and explore various possible answers.

Exploring

In the exploration stage, fifth-grade students are given the opportunity to test the material they have learned through experiments or direct exploration, which helps them understand the material more easily. Students are encouraged to develop problem-solving skills by trying new things and testing hypotheses so that they can face challenges and find solutions independently (Daryanto, 2014).

In the scientific approach, activities at this stage are not limited to observation or experimentation, but also involve students in active thinking, questioning, discussing, and seeking additional information (Hosnan, 2014). This is in line with Piaget's constructivist theory, which emphasizes the importance of active learning in knowledge formation (Slavin, 2018). Ultimately, this activity deepens students' understanding of the food chain material in the ecosystem being studied.

Associate

In a scientific-based strategy, the association stage is a process in which fifth-grade students process data and information obtained through observation, experiments, or explorations to draw conclusions and understand the relationships between existing elements (Sani, 2019).

After conducting observations, the first step in analyzing is to evaluate the results obtained. Analyzing in a scientific approach is very important to equip fifth-grade students with critical thinking, problem-solving, communication, and decision-making skills that are

needed in their education and future professional life (Partnership for 21st Century Skills, 2019).

Brookhart (2010) emphasizes in his research that the ability to associate or connect information is an important component of critical thinking that must be developed early on. This stage teaches students to see patterns, make inferences, and draw conclusions based on existing evidence.

Communicating

Through the communication stage in the scientific approach, fifth-grade students not only learn to convey their findings or knowledge, but also to think systematically, organize information clearly, and listen to and respond to others' opinions constructively (Hosnan, 2014).

Based on the researchers' findings, in the scientific learning process stage, communication activities provide Grade VA students with the opportunity to convey their analysis results to others, both verbally and in writing. The National Research Council (2012) emphasizes that the ability to communicate scientific research results is one of the important competencies in science literacy.

Research by Mercer and Dawes (2014) shows that structured classroom discussions can improve students' communication and conceptual understanding skills. In the context of ecosystem learning, students can present their observations of the food chain, explain the relationships between living things, and discuss with classmates to deepen their understanding.

Learning Outcomes and Student Development

The results of applying scientific-based strategies in the learning process show an increase in students' understanding and skills. Through an approach based on observation, experimentation, questioning, association, and communication, students are able to develop their analytical thinking skills. This is in line with Machin's (2014) research, which shows that the implementation of a scientific approach can significantly improve student learning outcomes.

The learning outcomes of grade VA students in IPAS subjects before the implementation of scientific-based learning strategies at SD Negeri 160 Palembang showed considerable variation. Based on interviews with homeroom teachers and IPAS teachers, although there were some students who did not succeed individually due to their respective limitations, they were able to follow the lessons better in face-to-face interactions and daily activities.

For example, there were students who were able to write but had difficulty understanding the material. Therefore, learning outcomes at this stage reached around 75% in the application of scientific-based learning. This is shown in the table mapping the

development of class VA students at SD Negeri 160 Palembang, which illustrates student progress in each stage of learning.

Based on the mapping of the knowledge of grade VA students in the application of scientific methods, there are several students who have begun to develop because each individual's understanding is tailored to their respective needs. To meet the requirements of the 5M steps (Observe, Question, Explore, Associate, Communicate), teachers combine scientific strategies with several other methods tailored to the individual needs of students.

Differentiated Learning Strategy

To overcome the challenge of some students not yet succeeding in class VA despite using scientific-based learning strategies, the teacher applies differentiated learning. Tomlinson (2014) states that differentiated learning is an approach that adapts instruction to diverse learning needs.

Some students may need more detailed explanations, more time, or a visual approach to understand the material. Teachers provide various types of learning resources that suit each student's learning style and use group work to support students who have difficulty understanding IPAS subject material.

Research by Hall et al. (2013) shows that cooperative learning can improve the learning outcomes of students with diverse abilities. In the context of class VA, collaboration between students helps them learn from each other and support each other in understanding ecosystem concepts.

Supporting and Inhibiting Factors

In the teaching and learning process, there are supporting and inhibiting factors in the implementation of scientific-based learning strategies at SD Negeri 160 Palembang.

Supporting Factors

The main supporting factor is the availability of learning media facilities that are useful for teachers and students in implementing science-based learning strategies in IPAS subjects. According to Arsyad (2013), the availability of adequate learning media can increase the effectiveness of the learning process.

Other supporting factors include human resources, such as the principal, vice principal of curriculum, teachers, students, parents, as well as the community and government. They make important contributions to education, especially in learning. The role of the principal is essential in supporting all learning needs, such as providing materials for making dioramas of food chain components.

Research by Fullan (2016) emphasizes that school leadership support is a key factor in the successful implementation of learning innovations. Visionary and supportive principals can create a school climate conducive to the development of innovative learning strategies.

Inhibiting Factors

The main obstacle is time constraints. The time available is very limited, so scientific-based learning cannot be implemented optimally. This happens because teachers must apply variety in learning to meet the diverse needs of VA class students in a limited time.

As a result, teachers often feel that they do not have enough time to complete the learning material and meet the needs of each student. They often find it difficult to manage their time and feel that they do not have enough time for effective learning. Research by Arikunto (2013) shows that effective time management is a major challenge in implementing complex learning approaches.

To overcome these obstacles, Grade VA teachers must plan and allocate their time more efficiently. Good time management strategies can help teachers optimize each stage of scientific learning without compromising the quality of learning (Joyce & Weil, 2015).

CONCLUSION

Based on the research, it can be said that the application of the Scientific Approach Learning Strategy at SD Negeri 160 Palembang in the IPAS subject on the Ecosystem material is very suitable to be applied in teaching and learning activities so that learning objectives can be achieved in class VA and so that students do not only gain knowledge, but also develop skills, critical thinking, analytical thinking, and creative skills at this school is to determine the students' initial understanding and their specific needs in applying the scientific approach learning strategy in class VA. This also shows an increase in students' understanding of learning skills, as indicated by the table mapping the development of students in class VA. With strategies based on observation, experimentation, question and answer, association, and communication, students are able to develop their critical and analytical thinking skills.

Suggestions for future researchers to consider a qualitative approach to explore in more depth the factors that influence the findings in this study. Methods such as in-depth interviews, focus group discussions (FGD), or narrative studies can be used to capture the more complex nuances and meanings from the respondents' perspectives.

REFERENCES

- Anderson, L. W., & Krathwohl, D. R. (Eds.). (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. New York: Longman.
- Arikunto, S. (2010). *Research procedures: A practical approach*. Jakarta: Rineka Cipta.
- Arsyad, A. (2013). *Learning media*. Jakarta: Raja Grafindo Persada.
- Bogdan, R., & Biklen, S. K. (2007). *Qualitative research for education: An introduction to theories and methods* (5th ed.). Boston: Pearson Education.

- Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27-40. <https://doi.org/10.3316/QRJ0902027>
- Brookhart, S. M. (2010). *How to assess higher-order thinking skills in your classroom*. Alexandria, VA: ASCD.
- Bybee, R. W., Taylor, J. A., Gardner, A., Van Scotter, P., Powell, J. C., Westbrook, A., & Landes, N. (2006). The BSCS 5E instructional model: Origins and effectiveness. *Colorado Springs, CO: BSCS*, 5, 88-98.
- Creswell, J. W. (2015). *Qualitative research & research design: Choosing among five approaches* (3rd Edition). Yogyakarta: Pustaka Pelajar.
- Daryanto. (2014). *Scientific learning approach in the 2013 curriculum*. Yogyakarta: Gava Media.
- Fullan, M. (2016). *The new meaning of educational change* (5th ed.). New York: Teachers College Press.
- Hakim, T. (2005). *Learning Effectively*. Jakarta: Pustaka Pembangunan Swadaya Nusantara.
- Hall, T., Vue, G., Strangman, N., & Meyer, A. (2013). *Differentiated instruction and implications for UDL implementation*. National Center on Accessing the General Curriculum. Retrieved from <http://aem.cast.org/about/publications/2003/ncac-differentiated-instruction-udl.html>
- Hosnan, M. (2014). *Scientific and contextual approaches in 21st century learning: The key to successful implementation of the 2013 curriculum*. Bogor: Ghalia Indonesia.
- Joyce, B., & Weil, M. (2024). *Models of teaching* (9th ed.). Boston: Pearson Education.
- Krajcik, J. S., & Shin, N. (2014). Project-based learning. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (2nd ed., pp. 275-297). Cambridge: Cambridge University Press.
- Kvale, S., & Brinkmann, S. (2015). *InterViews: Learning the craft of qualitative research interviewing* (3rd ed.). Thousand Oaks, CA: Sage Publications.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage Publications.
- Machin, A. (2014). Implementation of scientific approach, character building, and conservation in learning growth material. *Indonesian Journal of Science Education*, 3(1), 28-35. <https://doi.org/10.15294/jpii.v3i1.2898>
- Marzano, R. J., Pickering, D., & Pollock, J. E. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement*. Alexandria, VA: ASCD.
- Mayer, R. E. (2014). *Cognitive theory of multimedia learning*. In R. E. Mayer (Ed.), *The Cambridge handbook of multimedia learning* (2nd ed., pp. 43-71). Cambridge:

Cambridge University Press.

- Mercer, N., & Dawes, L. (2014). The study of talk between teachers and students, from the 1970s until the 2010s. *Oxford Review of Education*, 40(4), 430-445. <https://doi.org/10.1080/03054985.2014.934087>
- Miles, M. B., & Huberman, A. M. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). Thousand Oaks, CA: Sage Publications.
- Moleong, L. J. (2014). *Qualitative research methodology* (Revised edition). Bandung: Remaja Rosdakarya.
- National Research Council. (2012). *A framework for K-12 science education: Practices, crosscutting concepts, and core ideas*. Washington, DC: National Academies Press.
- Patton, M. Q. (2015). *Qualitative research & evaluation methods: Integrating theory and practice* (4th ed.). Thousand Oaks, CA: Sage Publications.
- Sani, R. A. (2014). Scientific learning for the implementation of the 2013 curriculum. Spradley, J. P. (2016). *Participant observation*. Long Grove, IL: Waveland Press. Sugiyono. (2017). *Quantitative, qualitative, and R&D research methods*. Bandung: Alfabeta.
- Tomlinson, C. A. (2014). *The differentiated classroom: Responding to the needs of all learners* (2nd ed.). Alexandria, VA: ASCD.
- Toyiba, F., & Nurdyansyah. (2018). The effect of active learning strategies on learning outcomes in Madrasah Ibtidaiyah. *Muhammadiyah University Sidoarjo*, 3(2), 929-930.
- Walsh, J. A., & Sattes, B. D. (2015). *Questioning for classroom discussion: Purposeful speaking, engaged listening, deep thinking*. Alexandria, VA: ASCD.