

SCIENTIFIC APPROACH IN LEARNING BASED ON THE 2013 CURRICULUM

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Abstract: The scientific approach is one of the approaches used in learning based on the 2013 Curriculum. This approach emphasizes the learning process that actively involves students through scientific activities such as observing, asking questions, gathering information, reasoning, and communicating. The purpose of this article is to examine the concept and application of the scientific approach in learning based on the 2013 Curriculum. The method used in writing this article is a literature study by reviewing various sources such as books, scientific journals, and articles relevant to the topic of discussion. The results of the study indicate that the application of the scientific approach can help improve student activity, critical thinking skills, and understanding of learning materials. In addition, this approach also encourages students to be more active in the learning process and is able to develop scientific skills. Thus, the scientific approach has an important role in improving the quality of learning in accordance with the objectives of the 2013 Curriculum.

Keywords: Scientific approach, 2013 Curriculum, learning process, student activities, critical thinking, scientific skills, learning outcomes.

INTRODUCTION

Education is an important factor in improving the quality of human resources. Through education, students are expected to be able to develop their potential in terms of knowledge, skills and attitudes. In the face of increasingly rapid developments in science and technology, the education system needs to adapt to the demands of the times. One of the government's efforts to improve the quality of education in Indonesia is through the implementation of the 2013 Curriculum, which emphasizes the development of comprehensive student competencies, encompassing attitudes, knowledge, and skills.

In its implementation, the 2013 Curriculum uses the Scientific Approach as one of the main approaches in the learning process. This approach emphasizes learning activities that actively involve students through stages of scientific activities. According to Daryanto (2014), the scientific approach is a learning approach designed so that students actively

build concepts, laws, or principles through stages of scientific activities such as observing, asking questions, collecting data, reasoning, and communicating learning outcomes.

According to Hosnan (2014), the scientific approach is a learning process designed so that students actively construct concepts, laws, or principles through scientific stages so that they are able to develop critical, logical, and systematic thinking skills. In addition, Rusman (2015) explains that the scientific approach in learning provides opportunities for students to gain knowledge through scientific processes so that learning becomes more active and meaningful for students. Journal research also shows the importance of applying a scientific approach in learning.

Research conducted by Sutarto (2017) in an educational journal article stated that the application of a scientific approach in learning can improve learning activities and students' critical thinking skills because students are directly involved in the process of observation, information collection, and delivery of learning outcomes.

Understanding the Scientific Approach

The Scientific Approach is a learning approach that emphasizes the scientific process in acquiring knowledge. This approach is used in the implementation of the 2013 Curriculum to encourage students to be active in the learning process through scientific activities such as observing, asking questions, collecting information, reasoning, and communicating learning outcomes. Through this approach, students not only receive information from teachers, but are also trained to discover and understand concepts independently through a scientific thinking process.

According to Daryanto (2014), the scientific approach is a learning approach designed so that students actively build concepts, laws, or principles through stages of scientific activity. These stages include the activities of observing, asking questions, collecting data, reasoning, and communicating learning outcomes. With this approach, the learning process is expected to provide a more meaningful learning experience for students.

Another opinion was put forward by Hosnan (2014) who stated that the scientific approach is a learning approach that provides students with the opportunity to actively build knowledge through the stages of the scientific method. Through this process, students can develop critical, logical, and systematic thinking skills in understanding various learning concepts.

According to Rusman (2015), the scientific approach is a learning approach that emphasizes the scientific process in acquiring knowledge. In this approach, students are actively involved in the learning process so that they can directly experience the process of discovering knowledge through observation, discussion, and information analysis activities. Abdul Majid (2014) also stated that the scientific approach is a learning approach that uses scientific steps in the learning process to help students understand concepts more deeply. This approach not only focuses on learning outcomes, but also on the learning process which involves students' active thinking activities. Another study conducted by David H. Jonassen (2011) also stated that scientific inquiry-based learning can help students develop higher-order thinking skills. Through exploration activities, information analysis, and drawing conclusions, students can build a more systematic understanding of concepts.

Based on various expert opinions and research results in the journal, the scientific approach can be understood as a learning approach that emphasizes the scientific process in acquiring knowledge through the active involvement of students in observation, investigation, analysis, and delivery of learning outcomes. This approach is expected to improve the quality of the learning process and develop students' critical thinking skills and scientific skills.

Advantages of the Scientific Approach

The scientific approach is a learning method that emphasizes the active involvement of students in the process of acquiring knowledge through scientific stages, including observing, asking questions, collecting information, reasoning, and communicating learning outcomes. This approach is one of the main strategies in the 2013 Curriculum which is designed to develop students' competencies comprehensively, namely attitudes, knowledge and skills. Compared to traditional methods, which tend to emphasize the teacher as the primary source of information, the scientific approach places students at the center of active and creative learning. Here are some of the key advantages of the scientific approach:

Increasing Student Activeness and Participation

One of the main advantages of the scientific approach is that it increases student activity and participation in the learning process. In the observation stage, students are invited to pay close attention to phenomena or objects, either through experiments, field observations,

or simulations. The questioning stage encourages students to develop curiosity and question the observed phenomena, so that they are encouraged to think critically. Next, through the stages of collecting information and reasoning, students learn to collect data systematically, analyze it, and draw conclusions. Finally, the stage of communicating learning outcomes makes students accustomed to conveying their findings clearly, both orally and in writing. This process makes students more active, motivated, and have a sense of ownership of their own learning process (Arifin et al., 2023).

Developing Critical, Creative, and Independent Thinking Skills

The scientific approach is also effective in developing critical and creative thinking skills. The stages of scientific thinking require students to analyze problems, evaluate evidence, compare hypotheses, and draw conclusions logically and systematically. With this process, students not only learn to receive information, but also to evaluate, filter, and decide which information is relevant and accurate. In addition, students are encouraged to find their own solutions and develop new ideas to solve problems, so that creativity and learning independence are increasingly trained. This independence is very important in 21st-century education, because students are expected to be able to think innovatively, solve problems independently, and be prepared to face real world challenges (Pratiwi & Putra, 2022).

Deepen Understanding of Concepts

One of the main goals of learning is to understand concepts in depth, not just memorize information. The scientific approach encourages students to construct their own knowledge through meaningful learning experiences. By engaging directly in the process of exploration and discovery, students can connect theory to practice, making the concepts learned easier to remember and apply in a variety of situations. For example, in science, students who conduct their own experiments will understand Newton's laws or chemical reactions better than those who simply read from a textbook. Research shows that students' conceptual understanding increases significantly when the scientific approach is applied correctly (Wulandari et al., 2022).

Improving Collaboration and Communication Skills

Many activities in the scientific approach are conducted in groups, allowing students to work together, discuss, and communicate their analysis clearly and effectively. These group activities foster social skills, such as respecting the opinions of peers, negotiating, and solving problems together. Furthermore, students are trained to communicate their findings systematically, both orally and in writing, a crucial skill in both academic and

professional settings. Thus, the scientific approach focuses not only on intellectual development but also on social and communication skills (Arifin et al., 2023).

Making Learning More Interesting, Fun, and Interactive

The learning process based on scientific activities makes the classroom atmosphere more dynamic, interactive, and fun. Students feel directly involved in the learning process, increasing their curiosity and motivation to learn. Exploratory activities, such as experiments, field observations, discussions, and presentations, increase student enthusiasm and keep them engaged throughout the lesson. Active interactions between teachers and students, as well as between students, also foster a collaborative and positive learning climate. This makes learning more effective and can improve overall student learning outcomes (Wulandari et al., 2022).

Supporting the Implementation of the 2013 Curriculum and 21st Century Learning

The scientific approach aligns with the principles of the 2013 Curriculum, which emphasizes the integration of attitudes, knowledge, and skills. Furthermore, this approach supports the development of 21st-century skills, such as critical thinking, creativity, collaboration, effective communication, and independent learning. With consistent application, the scientific approach helps students prepare themselves to face global challenges and rapid technological developments, so that they become not only academically competent learners, but also socially and professionally ready (Nurdin & Ramli, 2023).

Disadvantages of a Scientific Approach

While the scientific approach has many advantages, in practice it also has several shortcomings and challenges that teachers and schools need to consider for optimal implementation. Here are some of the main shortcomings:

Requires Longer Time

The scientific learning process involves a comprehensive process, from observing, asking questions, gathering information, reasoning, and communicating learning outcomes. These stages require a longer timeframe than conventional learning methods. In a busy learning schedule, teachers sometimes struggle to complete all the material as planned. This can be especially challenging for subjects with many abstract concepts or a large amount of material (Yuliana & Rahman, 2021).

Teacher Readiness is a Determining Factor

The success of the scientific approach depends heavily on the teacher's competence in designing and managing the learning process. Teachers must be able to facilitate each stage appropriately, prepare learning media and resources, and guide students in critical and creative thinking. A lack of teacher skills in implementing the scientific approach can make the learning process ineffective and lead to student confusion or loss of motivation (Arifin et al., 2023).

Limitations of Media and Learning Resources

Many scientific activities, particularly those involving experiments or observations, require adequate media, tools, and supporting materials. Not all schools have adequate laboratory facilities, experimental equipment, or learning materials. This lack of resources can limit students' ability to conduct experiments or collect data, resulting in less than optimal learning (Pratiwi & Putra, 2022).

Challenges in Managing Students Individually and in Groups

Scientific learning is often conducted in groups, so teachers must be able to manage group dynamics to ensure all students are actively involved. In practice, some students are passive or dependent on others, so not all students receive an equal learning experience. Furthermore, teachers must adapt their approach to individual student abilities to ensure no one is left behind (Wulandari et al., 2022).

Requires Careful Planning and Preparation

The scientific approach cannot be implemented improvised. Teachers must plan activities, prepare media, determine learning objectives, and design appropriate evaluations. Inadequate preparation can make the learning process ineffective and even lead to student confusion. This requires a significant amount of time, effort, and creativity from teachers (Arifin et al., 2023).

The Complex Challenges of Learning Outcome Assessment

Because the scientific approach emphasizes thinking processes and skills, assessment is not only based on final results, but also on students' skills in observing, questioning, reasoning, and communicating results. This complex assessment can sometimes be confusing for teachers, especially those accustomed to quizzes or written exams (Yuliana & Rahman, 2021).

Comparison of the Scientific Approach with Other Learning Approaches

The scientific approach is a learning strategy that emphasizes active student involvement in the process of acquiring knowledge through scientific stages. These stages include observing, asking questions, gathering information, reasoning, and communicating learning outcomes. With this approach, students are not merely passive recipients of information but also actively construct their own knowledge. The scientific approach is at the core of the 2013 Curriculum because it can develop students' comprehensive competencies: attitudes, knowledge, and skills.

When compared to the conventional or lecture approach, the most striking difference lies in the role of the student. In the conventional approach, the teacher is the center of learning, and students tend to passively receive information. Material is delivered orally, with students primarily taking notes or memorizing. As a result, conceptual understanding is often shallow, critical thinking skills are rarely honed, and student motivation can decline due to minimal involvement. In contrast, the scientific approach places students at the center of learning. Students are encouraged to observe phenomena, ask questions about things they don't understand, collect data through simple experiments or research, reason about the results obtained, and communicate findings orally and in writing. With this systematic process, student engagement increases, conceptual understanding deepens, critical and logical thinking skills are honed, and social skills such as collaboration and communication also develop significantly (Arifin et al., 2023). For example, in science learning, students who conduct their own experiments will better understand Newton's laws or chemical reactions than those who simply read a textbook.

Compared to the discovery approach, both emphasize active student involvement in discovering knowledge. However, the scientific approach has a clearer structure through systematic scientific stages. Each stage has a specific purpose: observing to identify phenomena, asking questions to generate hypotheses, gathering information to find evidence, reasoning to draw conclusions, and communicating results to build communication and collaboration skills. Meanwhile, the discovery approach is more flexible and tends to emphasize students' free exploration without going through fully structured scientific stages. The discovery approach is excellent for stimulating creativity, imagination, and interest in learning, but it does not always train logical and systematic thinking skills as deeply as the scientific approach. Therefore, the scientific approach can be said to be more balanced between developing creativity and analytical thinking skills (Pratiwi & Putra, 2022).

Compared to Problem-Based Learning (PBL), there are similarities in terms of active student engagement and the development of critical thinking skills. PBL emphasizes solving real-world problems presented by the teacher, encouraging students to find solutions by identifying problems, analyzing information, and designing solutions. PBL is very effective for developing analytical, collaborative, and communication skills, as well as providing contextual learning experiences. However, PBL does not always emphasize the entire scientific process systematically, as in the scientific approach. Students may focus on solving a specific problem, while the stages of detailed observation or reasoning through empirical evidence are not always carried out. In contrast, the scientific approach ensures that students go through each scientific stage, so that not only solutions are found but also logical, analytical, and systematic thinking processes are well-trained (Wulandari et al., 2022).

Furthermore, the scientific approach places greater emphasis on developing social skills and collaboration than conventional approaches. Group activities require students to communicate, express opinions, listen to peers, and respect the ideas of others. This simultaneously fosters interpersonal skills essential for real-world learning. PBL, on the other hand, emphasizes group work, but its focus is more on achieving problem solutions, rather than the complete scientific process. The discovery approach is often conducted individually, thus limiting social collaboration.

In terms of conceptual understanding, the scientific approach excels because students construct their own knowledge based on real-world experiences. Material isn't simply studied theoretically, but also through experimentation, observation, and analysis, making concepts easier to remember and apply. Meanwhile, conventional approaches tend to rely on memorization, PBL focuses on solving specific problems, and discovery learning focuses more on free exploration. Therefore, the scientific approach offers a balance between conceptual understanding, thinking skills, and social skill development.

Overall, compared to other approaches, the scientific approach excels in:

1. Increase student activity and participation in learning.
2. Deepen understanding of concepts through meaningful learning experiences.
3. Develop critical, creative, logical and independent thinking skills.
4. Improve students' collaboration, communication, and social skills.
5. Creates high learning motivation because learning is more interesting and interactive.

Conventional, discovery, and PBL approaches each have their own advantages, such as ease of implementation (conventional), creativity and free exploration (discovery), or real-

world problem solving (PBL). However, for learning based on the 2013 Curriculum, which emphasizes holistic competency development, the scientific approach is more appropriate because it can integrate attitudes, knowledge, and skills in a balanced manner, and prepare students to face the challenges of the 21st century.

CONCLUSION

The scientific approach is a learning method that emphasizes the scientific process and active student involvement in acquiring knowledge. Through the stages of observing, asking questions, gathering information, reasoning, and communicating results, students not only passively receive information but also construct an understanding of concepts independently and systematically. This approach supports the development of critical, logical, creative, and independent thinking skills, while also enhancing students' collaboration and communication skills.

The main advantages of the scientific approach include increasing student activity, deepening conceptual understanding, training critical and creative thinking, creating interesting and interactive learning, and supporting the implementation of the 2013 Curriculum and 21st century learning. However, its implementation also faces several challenges, such as requiring a longer time, teacher readiness being a determining factor, limited media and learning resources, and complex assessment of learning outcomes.

When compared with other approaches, such as conventional, discovery, or Problem-Based Learning (PBL), the scientific approach is superior in integrating attitudes, knowledge, and skills in a balanced manner, as well as preparing students to face the challenges of the 21st century. Therefore, the application of the scientific approach is an effective and relevant learning strategy in improving the quality of education and students' overall competence.

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