

Implications of the Philosophy of Science School on the Development of Contemporary Science

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ARTICLE INFO	ABSTRACT
Volume: 4 ISSN: 2963-5489	Philosophy of science is one of the branches of philosophy that examines the foundations, principles, and methods in science, and acts as a means of critical reflection on the development of science. This article discusses the influence of four main schools in the philosophy of science, namely positivism, falsificationism, scientific paradigm, and postmodernism and constructivism on the development of contemporary science, especially in the context of education. This study uses a literature study method with a qualitative-analytical approach. The findings show that positivism encourages the birth of quantitative approaches and data-based evaluation systems, falsificationism provides a foundation for the development of inquiry-based learning and critical thinking, the scientific paradigm approach helps to understand changes in curriculum and learning models, while postmodernism and constructivism emphasize the importance of diversity of viewpoints, contextual learning, and recognition of cultural diversity. Therefore, understanding the philosophy of science is an important foundation in designing an education system that is more adaptive, reflective, and contextual to today's challenges.
KEYWORD	
Philosophy of Science, Positivism, Falsehoodism, Scientific Paradigm, Postmodernism, Constructivism, Contemporary Education	

1. Introduction

The philosophy of science plays an important role in directing the development of science to take place systematically and ethically. Over time, the philosophy of science has also undergone development in line with the evolution of science itself. Every progress in science has always been supported by certain philosophical schools that form the characteristics of the dominant paradigm of its time.

The various streams in the philosophy of science have a great influence on the way we understand and develop science today. Positivism emphasizes that science must be based on observable data and facts. Falsificationism teaches that all scientific theories must be testable and possibly disproved. The scientific paradigm shows that the development of science does not always go straight, but can undergo major changes. Meanwhile, postmodernism and constructivism see science as the result of cultural, value, and historical influences. Studying all of these streams is important because science is constantly changing and increasingly influenced by different fields and social contexts. By understanding the philosophy of science, we can see science not only as a theory, but also as a tool to answer real problems and support human values.

2. Literature Review

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Philosophy and science are two interrelated and inseparable fields, as they grow and develop along with the course of human civilization. Philosophy seeks to answer fundamental questions about human life, the universe, and existence, while science develops as a human attempt to understand the physical world through empirical and rational approaches. From this, it can be concluded that there is a close relationship between the two. Philosophy provides a conceptual and methodological basis for science, while science plays a role in providing evidence and data that strengthens philosophical thinking (Kuhn, 2012). Throughout the history of the development of science, the role of philosophy of science has been very real, especially when there is a change in perspective or a paradigm shift. The emergence of various schools such as positivism, falsificationism, scientific paradigms, to postmodern thought and constructivism shows that every scientific progress is always preceded by a process of deep philosophical reflection

Thomas Kuhn introduced the concept of paradigm in his book *The Structure of Scientific Revolutions*. The term comes from the words "paradigm" (English) or "paradigme" (French), which means a clear example or archetype. In philosophy, paradigm refers to the philosophical and theoretical framework of thinking within a discipline, which includes theories, laws, generalizations, and experiments that support it (Farid, 2021). This paradigm reflects a common agreement among a group of scientists and distinguishes one scientific community from another. Paradigm differences in science are usually caused by the diverse theoretical backgrounds, philosophies, methods, and analytical tools used (Kesuma & Hidayat, 2020). In the context of contemporary times, the paradigm of science is no longer seen as something absolute and final, but as the result of a social construction that is relative and open to change. This means that science develops historically and in accordance with the social context, so that it continues to undergo changes along with the needs and development of society.

3. Methodology

This study applies a literature study method with a qualitative approach that is philosophical. Information is obtained from secondary sources such as books, scientific articles, and academic works that discuss theories of truth in the philosophy of science. The analysis is carried out with descriptive-analytical and comparative methods to explore and compare inductive, deductive, and alternative approaches in interpreting the truth in the scientific scope.

4. Results and Discussion

4.1 Implications of the Positivism School on the Paradigm of Contemporary Science

Positivism is a school of philosophy that emphasizes the importance of scientific methods, empirical observation, and analysis of real data in understanding the world and the phenomena in it. This approach assumes that valid knowledge can only be obtained through a rational and evidence-based scientific process. This idea was developed by Auguste Comte, a 19th-century French philosopher who is considered the father of positivism (Arifin, 2020). In positivism, everything must be objectively observable and tested, so metaphysical speculation that is not supported by empirical evidence is rejected. Comte also stated that the development of human knowledge goes through three stages, namely theological, metaphysical, and positive stages. The positive stage marks the maturity of science based on observable and proven laws of nature. Therefore, positivism only recognizes natural science as a legitimate source of knowledge, rejects all forms of speculation, and believes that this approach is able to provide a strong and reliable basis for life and society (Mayadah, 2020; Scott, 2018)

In the context of contemporary education, the philosophy of positivism has had a huge influence, especially in the development of research methods and evaluation systems. Positivism, which emphasizes the importance of empirical observation, measurable data, and objectivity, became the basis for the emergence of quantitative research approaches. This approach focuses on the systematic use of numbers, statistics, and measurements to understand educational phenomena. As a result, various policies and decisions in the world of education today are often based on the results of standardized tests, national surveys, and other quantitative indicators. This reflects the belief that valid and reliable knowledge must be scientifically testable and based on measurable data.

In addition, the school of positivism has also encouraged the birth of a scientific paradigm that focuses on facts and data as the main basis. As a result, various decisions and policies in the scientific field are prepared based on strong and accountable empirical evidence. This approach supports the birth of accurate and verified scientific findings, so that the direction of scientific development becomes more systematic and stable. In addition, this paradigm also opens up space for the use of modern technology and measurement instruments to increase the validity and reliability of the data obtained.

Overall, it can be concluded that although positivism makes a major contribution to developing a structured and data-driven education system, this approach needs to be complemented by other perspectives in order to be able to capture the complexity of the world of education as a whole. The combination of objectivity positivism and the depth of the qualitative approach will result in a more balanced understanding, as well as support the creation of education that is not only technically effective, but also socially and emotionally meaningful for students.

4.2 Implications of the Falsification School on the Paradigm of Contemporary Science

Falsificationism is a school of philosophy of science introduced by Karl Popper as a criticism of the weaknesses of the logical positivism approach, especially in terms of verification. Popper considered that a theory could not be considered scientific simply because it had been proven true through repeated observations, because the supporting data did not guarantee absolute truth. On the contrary, a theory is said to be scientific if it can be tested and allowed to be refuted by empirical facts. This means that the theory must make clear and specific predictions, so that they can be proven wrong if they contradict the results of observations. This view places science as an open process that continues to evolve through correction and testing, rather than as a collection of final truths.

In the field of education, the principle of falsificationism makes an important contribution to the birth of an active and exploratory learning approach. Approaches such as inquiry-based learning and experiment-based learning are a form of direct implementation of the falsification principle. Students not only act as receivers of information, but are also invited to formulate questions, make hypotheses, make observations or experiments, and draw conclusions from their own findings. This process accustomed students to actively engage in learning activities, while also developing a deeper understanding as it is based on hands-on experience and personal involvement.

The application of falsificationism in learning also plays a role in shaping students' scientific character, such as thinking critically, being open to criticism, and not afraid of mistakes. This attitude is very important in the face of fast-paced and uncertain times. With the ability to constantly evaluate and question information, students will be better prepared to face real challenges outside of the classroom. Therefore, falsificationism is not only relevant in the realm of philosophical theory, but also the basis for learning that encourages independent thinking, analytical acuity, and the ability to adapt to changing situations (Nurhayati & Wahyuni, 2023).

4.3 Implications of the Scientific Predigma School on the Paradigm of Contemporary Science

The scientific paradigm is a school of thought in the philosophy of science that emphasizes the importance of conceptual frameworks, values, and methods adopted by the scientific community in developing knowledge. This concept is rooted in the thought of Thomas S. Kuhn through his work *The Structure of Scientific Revolutions* (1962), who explained that the development of science does not take place in a linear and cumulative manner, but through a process of paradigm revolution.

In the world of education, Thomas Kuhn's views on paradigm change are very relevant and can be observed through a shift in curriculum orientation and learning methods. For example, the shift from a teacher-centered learning model that places teachers at the center of information, to a student-centered learning model that emphasizes the active role of students in the learning process. In addition, approaches such as project-based learning are also increasingly popular, where students are directly involved in exploration, information searching, and real problem-solving activities. However, these changes often face challenges in the form of resistance from various parties, including teachers and educational institutions, as the new paradigm demands a change in perspectives and skills that are different from old habits. However, with adequate support, the process of adaptation to the new paradigm will take place and form a more responsive and dynamic education system (Sari & Putra, 2021). Thus, the application of the Kuhn paradigm in the world of education not only provides a theoretical framework for understanding how science develops, but also becomes a practical guide in designing an education system that is adaptive, reflective, and ready to face global changes.

4.4 Implications of the Schools of Postmodernism and Constructivism on the Paradigm of Contemporary Science

Postmodernism and constructivism are scientific ideas that reject the idea that there is one truth that is always true for everyone. They believe that knowledge is relative, meaning it can differ depending on who sees it and under what conditions. Postmodernism says that we cannot understand the world in just one way or point of view, but must look at it from many different sides. Constructivism, on the other hand, teaches that science is not a definitive picture of the world, but the result of interactions between people and their social environment, including culture, language, and power around them. So, truth is created and formed in a social process, not something that already exists absolutely. In this way, science becomes more open

to different views and ways of understanding the world, so that it can help us see the complex human life in a more complete and diverse way.

The currents of postmodernism and constructivism changed the way we view science today. Both schools reject the idea that there is one absolute truth that applies to all people. On the other hand, knowledge is considered different and is greatly influenced by the culture, language, and social environment of each individual. Therefore, science is not only about the same facts for everyone, but also about how people understand and form meaning based on their own experiences. This approach encourages researchers to look at a problem from different perspectives and use a variety of methods in search of answers.

In practice, this paradigm changes the way research and learning are conducted. The research not only focuses on data that can be measured quantitatively, but also pays attention to the stories and experiences of the subjects involved. Methods such as interviews, observations, and discussions are important for understanding the social and cultural context behind a phenomenon. With this approach, science becomes more complete, able to appreciate differences, and more in tune with the complex and diverse realities of life.

5. Conclusion

The philosophy of science plays a central role in shaping the theoretical and methodological foundations of science. As a branch of philosophy that examines the nature, structure, and dynamics of scientific knowledge, philosophy of science helps explain how science is developed, tested for truth, and understood in various contexts. In the contemporary era, science is no longer seen as something absolute and neutral, but as the result of social construction influenced by certain historical, cultural, and cultural backgrounds. Various schools in the philosophy of science such as positivism, falsificationism, scientific paradigm, as well as postmodernism and constructivism, have different influences on the way of understanding and developing science. Positivism emphasizes the importance of empirical data and objectivity, but often ignores the subjective dimension and human values. Falsificationism highlights the importance of testing and openness to error in the scientific process. Meanwhile, the scientific paradigm shows that scientific change is not linear, but through the stages of crisis and revolution of thought. Postmodernism and constructivism emphasize that knowledge is relative, shaped by social interaction, and open to diverse perspectives. The implications of these trends can be seen clearly in today's scientific practice, especially in the field of education. Starting from the dominance of data-based quantitative methods, to a learning approach that focuses on students' experiences and social interactions. This shows that there is no single approach that can fully explain the complexity of reality. Therefore, a deep understanding of the philosophy of science is essential to build a critical, reflective, and ethical scientific mindset in responding to the challenges of the times.

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