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Literature Review Article

The view of mathematics education as science

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ABSTRACT

This paper will discuss the view of mathematics education as science. This study is the result of a variety of relevant literature related to mathematics education as a science in a scientific discipline. Philosophically, mathematics is considered as the queen of science used by humans in everyday life. While knowledge itself is closely related to philosophy, where these two terms cannot be separated from each other. The science of studying natural phenomena itself. Science is the product of epistemology, ontology, and axiology. Philosophy and science are two similarities in that both seek the truth. A person who seeks the truth is a philosopher or philosopher. The source of philosophy is man, reason, and the human heart. For example, mathematics. Mathematics is a science about reasoning, about patterns and mathematics is the queen of science and at the same time a servant of science. Mathematics education is a mathematics lesson that makes students build logical thinking and build mathematical knowledge.

Keywords: philosophy; mathematics; mathematics education; science

1. INTRODUCTION

Philosophy is the basis of human thought, which seeks truth to understand and understand in life. Philosophy continues to evolve with the times. Kurniawan (2017) argues that in the beginning, philosophy included all objects that were broader than science. However, philosophy grows and is chosen from so many many sections, such as the philosophy of religion (belief), the philosophy of law (rules) and the philosophy of knowledge, the philosophy of mathematics, and so forth. The reason is that philosophy could not go on together with space that does not can be seen, but it must also direct and nurture knowledge. The search for the first philosophy has been an essential theme in the history of philosophy. It concerns the answer to the question, "What is the most fundamental part of philosophy whose questions and assumptions precede later reasoning or theory?" Aristotle argued for metaphysics as the first philosophy, claiming it was the most fundamental part of philosophy and had the highest degree of generality. Descartes chose epistemology as the first philosophy because epistemology is the basis of all our knowledge and knowledge. Heidegger proposed ontology, in metaphysics, as his first philosophy because, according to him, without being, as opposed to being, there is nothing at all. Eventually, Levinas places ethics as philosophy first, arguing that every philosophical question presupposes a human being, and being human is based primarily on ethics. Thus, the historical answer to the first philosophical question offers several branches of philosophy as candidates. What does this mean for mathematics education? Can mathematics education have a philosophy first? Are there unavoidable philosophical assumptions in conducting any investigation in our field? Could these assumptions be placed in one branch of philosophy?

Etymologically, philosophy is knowledge and the study of knowledge itself, what it is, and how it is possible. Plato first defined knowledge as a genuine belief that is justified. After Plato, Ancient Greek skeptics proposed that there was no definite way to justify a conviction. We'll take a quick look at one of the more difficult questions in philosophy: how can I know that my thoughts are warranted? To begin, let's look at justified beliefs and their problems and then explore some of the philosophies of the solution. As with many topics in philosophy, a widely agreed definition is complex. At the same time, philosophers have been trying to build on it for centuries. Over the years, a trend has developed in the philosophical literature, and a definition has emerged that has a broad agreement that has come to be known as the "standard definition." While the deal with the purpose is not universal, it can serve as a strong starting point for learning knowledge. Knowledge is reality or a situation for understanding something. Things by getting closer or make received from a case experienced or originated from experience. However, in practice, many definitions of logical and frequent knowledge are used by humans to look for experience life. Definition dominant knowledge used is an idea or drafted in thought man possessed by a tangible and necessary design for making effective decisions to reach that. Understanding knowledge needs meaning that has a connection close to news or notification, or natural explanation. In life, man, everyday definition knowledge already Becomes

a tool or ingredient in differentiating between data and compiled information by group meaningful and historical knowledge is something to believe in by truth and conviction.

According to Fadli (2001), stated that philosophy with science could walk together by the parallel with the use of method or strategy in the use of logical memory to face reality in life. Second term, this show an attitude of criticism/response, with pattern thinking fair and not heavy adjacent in knowing the truth. From science, knowledge develops and Becomes knowledge of math. Mathematics is knowledge learning to calm down thinking logically, form, group, or mutually exclusive designs continuous with one another. Where is math with philosophy also very related tightly ?. Are mathematics and mathematics education the same ?. The answer is Mathematics education " prioritizes " or dominates mathematics in the educational process, while "Mathematics" refers to "holy/original/pure" Mathematics. From here clear that education in mathematics, along with psychology study, teaches those who contribute to helping understand participant education and energy educator. How does connection philosophy with education and mathematics? How does philosophy education mathematics learning knowledge? And how do you regard the philosophy of mathematics education for expertise ?.

2. RESEARCH METHOD

According to Sugiono (2016), a Literature study is the study of theory or literature related to scientific interaction with man in various activities, suitable social and cultural activities that could search for the truth. Type articles used is Library studies taking different legitimate data source from various type of books and journals at home and abroad along with information from the internet that has been validated to its legal. Data already collected will be checked becomes writing, so trust the truth.

3. RESULTS AND DISCUSSION

3.1 Philosophy and Science Knowledge

Says " philosophy " is often heard when already set foot in the campus world or university. Etymologically, the word philosophy (Arabic) and philosophy (English) is derived from the Greek (Philosophia). Philosophia is some words consisting of the phrase (Philos) and (Sophia). The word Philos means lover or loved, also be a friend. As for Sophia, which means wisdom or wisdom, it means knowledge. Philosophia means the one who loves learning or the friend of knowledge. The term philosophy has been translated into "philosophy"; the adjective is "philosophy" and not "philosophy." When referring to the person, the correct word is "philosopher" and not "philosopher." Unless the term "philosophy" is used instead of "philosophy," then the proper adjective is "philosophical," while what refers to the person is the word philosopher (Solihin, 2022).

In a broad sense or In general, philosophy is a human activity in an attempt or process to understand or understand the meaning of fundamental truths about themselves. Those who study or understand philosophy will Keep going without becoming deeply involved in asking, answering, and debating to answer the most basic questions in life. Jan Hendrik Rafar (Ritaudin, 2015) suggests that the fundamental nature of philosophy is radical thinking (to the roots); searching for the principle (the essence of reality); chasing the truth; seeking clarity (clarity of the natural fact); rational thinking (systematic logic). In the process of seeking the truth, the first is man thinks or guesses thinking about everything there is or what happens; the second stage is some view or opinion eliminated. Become some trees that are considered central to be maintained; the third stage is the fruit tree's fruit that has been destroyed. It will become the main tree in seeking truth (search) knowledge based on facts, then develop into some knowledge usually used by humans, such as mathematics, physics, law, religion, and so on.

Philosophy is friend knowledge, while someone who tries to look for knowledge or wisdom is a philosopher or philosopher four things to philosophize: admiration, dissatisfaction, uncertainty, and curiosity (Sukardjono, 2000). A temporary point beginning from philosophy is human, mind, and heart/feeling human. Where is amazement impressed with something or amazed? In other words, their desired object is admired. Temporary dissatisfaction is there is feeling no happiness, or there is feeling dissatisfaction with something achieved thing. Doubt in question is the existence of uncertainty about something genuine. And for desire, ask what is meant the intention for asking or feeling curious about something. From the explanation above, philosophy is knowledge to seek truth in human life about what, how, and for whom?.

Heretofore discuss knowledge, especially formerly spoken about science. Van Peursen (Widiyawati, 2013) argues that at the time once knowledge was something part of philosophy, so that definition regarding knowledge depends on an arrangement philosophy that followed. Compass (2012) in the Australian Academy of Science, science is a collection of knowledge that has been tested certainty and arranged in something definite arrangement based on the scientific way. At the same time, knowledge is a notification of something events that have not been sure and not pushed the certainty. Science is a collection of several pieces of knowledge that are arranged with good and is a product of activity research in a scientific way. Knowledge is the lowest gain received from experience without doing a more strenuous and correct research activity/activity. Aristotle looked at knowledge as knowledge about cause and effect in something. The Liang Gie (Widiyawati, 2013) said that knowledge mention all knowledge by scientific view as round determination and knowledge showing field the knowledge you want to be studied in tree Thing main curtain Connection Among science and philosophy is one whole unified, whereas, in the process of developing Knowledge, a more-strong influence pattern thinks humans. Knowledge tries to study something that could be proven true with method temporary scientific philosophy alone make something look for an answer and prove the truth that could not be solved by science. Talk about Knowledge; there is a relation with Knowledge that has been discussed before. Knowledge is all activity or activities carried out to look for and to find out an object or something (Wahana, 2016, p. 46). Knowledge is a process or effort in seeing, hearing, feeling, and

thinking based on to do something action (Makheasy, 2018, p. 203). Surojiyo (2008: 57) definition of science involves at least six kinds of components, namely problem, attitude, method, activity, conclusion, and influence. So, Knowledge is something activities that be obtained by seeing with seeing, feeling for concluding something things, that formed answer from patterns thinks humans.

Exposure to science and knowledge could put together one term: knowledge. Knowledge is something science that studies phenomena naturally. Knowledge is usually defined as valid and justified belief. The definition has led to its measurement with a method that relies solely on the correctness of the answers. Right or wrong answers mean someone knows or does not know something. Knowledge refers to a solid understanding of facts or reality, information, and skills that could be obtained or received through learning, education, training, or experience. Truth is a quality situation that Becomes fact or correct and appropriate to reality or what happened. The history of philosophical reflection on knowledge is history and theory, but nothing less than questions, concepts, differences, synthesis, and taxonomies. They produced, colored, and perfected this philosophical theory of knowledge. The result is an epistemological attempt to understand what is fundamentally comprehensible about the nature and availability of knowledge. Here will gain an understanding of what philosophers think knowledge is and might be, along with why some philosophers think that knowledge does not exist and could not exist. Ridwan et al. (2021) stated that science is a part of recognized and accepted ontology, epistemology, and axiology as science. Knowledge is a way to involve knowledge systems of various types of knowledge acquired by checking carefully for getting something truth or fact using a particular method.

3.2 Connection Philosophy Mathematics with Mathematics Education

Education is an important requirement for human life. Suppose one Human does not have education or knowledge. In that case, someone cannot continue with his life because, with education, a man capable of understanding the meaning of life and the meaning of experience life has already passed and well traversed. A country wants its human resources to have excellent quality education. According to the Big Indonesian Dictionary, education is a process in changing attitudes and behavior that demands someone to endeavor to Act more mature in various lessons learned for example, in teaching, following various exercises, and so on. According to Plato, education is something things that could make development man could reach perfection and applied in his life. Even In the 1945 Constitution says: educate life nation means. Ideals the Indonesian nation is one of them is creating very high-quality education so that the country of Indonesia does not leave itself far behind developing countries. So, it could be concluded that education is defined as a process carried out through efforts and processes such as following training enhancement quality, controlling self, having noble morals, and so on.

Mathematics is structured science, and mathematics that is the language of symbols. In addition to education, mathematics is required by humans because math is the queen's knowledge, and, at the same time, so is his servant. Where is the math that could use in continuity life every day for example, in trading, statistics, and others? Mathematics is knowledge about patterns and relationships. Mathematics supports development because there is a wish man for an organized, easily understood, made a pattern so that everyone who reads and studies it can easily understand it. Development mathematics is realized from philosophy because philosophy is the source of all. Mathematics education is the ability to use to solve measurable problems. According to Wein (1973), mathematics education is "a study of those aspects of the basic nature and history of mathematics and the psychology of learning and teaching that will contribute to the understanding of teachers in their work with students, together with the study and analysis of school curricula, the principles which underlies the development and practice of its use in the classroom." The aim of mathematics education should include social justice through developing democracy of critical thinking in mathematics. Mathematics education should be able to strengthen students; it means that students think of mathematics in everyday life and could use it as a practice of applying mathematics. According to Ernest (2004), Strengthening students in mathematics has three dimensions, namely (1) Students have mathematical abilities, (2) Students can use mathematics in everyday life, and (3) Students believe in their abilities. Mathematics education could instruct and develop critical, systematic, logical, and creative thinking and the willingness to cooperate effectively (Depdiknas,2001, p.7). It could be concluded that mathematics education is a mathematics lesson that develops critical, systematic, logical thinking and a willingness to cooperate effectively with others.

Mathematics education refers to the problem of learning and teaching. Toward learning in mathematics education, philosophical thought has a significant role. Philosophy plays a role in creating a mathematics learning that allows students to build their logical thinking and mathematical knowledge. According to Ernest (Simangunsong, 2021), the philosophy of mathematics education questions the problems of (a) the nature of mathematics, (b) the history of mathematics, (c) the psychology of learning mathematics, (d) the theory of teaching mathematics, (e) child psychology concerning learning. Mathematics, (f) the development of the school mathematics curriculum, (g) the implementation of the mathematics curriculum in the classroom. According to Wahyudi (Sinaga et al., 2021), the relationship between mathematics and philosophy is the earliest intellectual attempt to understand the world around us. Both were born in Ancient Greece and underwent significant transformations there. The notion that philosophy is the father and mother of mathematics is wrong. Mathematics was never born from philosophy, but both developed together by giving each other problems as input and feedback. In the historical trajectory of the two twin sisters of philosophy and mathematics, they grew up together under the tutelage of the philosopher and mathematician Pythagoras (572-497 BC). Sari (2021) said that the relationship between mathematics and the philosophy of education is a mutually sustainable relationship with each other. Mathematics and philosophy of education discuss knowledge based on reason and rationality. Moreover, concurrently pursue the truth in the field of education and discuss phenomena in education.

3.3 The view of the Philosophy of Mathematics Education as a Science

The philosophy of mathematics has a crucial function: to provide a robust and systematic foundation for mathematical knowledge and truth (Ernest, 1991). The philosophy of mathematics is a branch of philosophy that studies mathematics's assumptions, foundations, and implications. It aims to understand the nature and methods of mathematics and to find the place of mathematics in people's lives. Here the philosophy of mathematics is helpful in (1) training students to think radically about the nature of mathematics, (2) training reflective thinking within the scope of mathematics, (3) avoiding absolute scientific truth, and assuming that mathematics is the only way obtaining the truth, (4) avoiding scientific egoism, i.e., not respecting other points of view outside the field of mathematics (Suharsaputra, 2004). The philosophy of mathematics provides accountability regarding the nature and methodology of mathematics in human life (Suyitno, 2014).

According to Slamet (2008), Details of the field of philosophy of mathematics that could be put forward and are expected to be more systematic include the following sections:

1. Mathematical epistemology is knowledge whose object of study is mathematical knowledge. Epistemology, one part of philosophy, is a reflective thought from knowledge such as possibility, origin, nature, limits, assumptions and foundations, validity, and reliability to the truth of knowledge.
2. Ontology is seen as a theory of what exists. The relationship between the ontological view and mathematics has generated quite some problems that some philosophers of mathematics have discussed. Mathematical statements' scope is questioned in mathematical ontology.
3. Mathematical axiology consists of ethics which discusses aspects of truth, responsibility, the responsibility and role of mathematics in life, and aesthetics which discusses the beauty of mathematics and its implications for life, which could affect other aspects, especially art and culture.

The philosophy of mathematics should include thoughts and ideas about what mathematics education is, what impact it has on society, the qualities that make a good teacher, the role of the teacher, research on learning standards and strategies, and practices to ensure students can learn mathematical concepts. The philosophy of mathematics education is to analyze, question, challenge, and criticize the claims of mathematics education practice, policy, and research. Mathematics education and mathematics Education are two frequent terms at issue. In her second term. Mathematics education is a field study that studies history, mathematics, psychology, learning, teaching mathematics, curriculum mathematics school, and its development and application at school. Mathematics education refers to the problem of learning and teaching. The philosophy of Mathematics Education includes the philosophy that discusses education and fields of studies math. Toward learning in mathematics education, philosophical thought has a significant role. Philosophy plays a role in creating a mathematics learning that allows students to build their logical thinking and mathematical knowledge. Philosophy and science are one unit and have a complementary relationship.

Philosophy and science are interrelated because everything is a human activity. The relationship between the two is analogized to philosophy as the mother of science, while science is the son of philosophy. Philosophy learns from science by emphasizing the whole of something because the whole has its nature that does not exist in its parts. According to Fadli (2021), the reality of the relationship between philosophy and science results from human thinking activities. Human activity is defined as a process as well as its results. When considering the results, all three results from conscious human thinking. When viewed in terms of the process, both indicate an activity that seeks to solve problems in human life (to obtain truth and knowledge), using specific methods or procedures systematically and critically. In science, philosophy has a leading position, origin, or principle. Because philosophy was the first to be the only human effort in the field of spirituality to achieve truth or knowledge, it could be concluded that science receives its basis from philosophy, among others:

1. Every science has objects and problems
2. Philosophy also provides the general basis for all science; on that general basis, the state of science is formulated.

In addition, philosophy provides special foundations used in each science.

1. The basis given by philosophy is regarding the nature of knowledge of all sciences. Each science cannot leave itself as a science by leaving the conditions determined by philosophy.
2. Philosophy even provides a method or way for every science.

The position of mathematics in science is significant. The development of science cannot be separated from mathematics. Mathematics helps other sciences analyze and synthesize various existing observations, find logical relationships, draw conclusions or interpretations and develop science itself. Mathematics has long been regarded as the source of specific knowledge that is best known to humanity. Science is at the heart of philosophy, and mathematical knowledge plays a unique role. Philosophy and mathematics do not doubt the past until now; these two fields of knowledge are closely related. Sinaga (2021) states that the philosophy of mathematics plays a role in providing a systematic foundation of mathematical knowledge and can protect that foundation from various contradictions and paradoxes concerning the mathematical truth of mathematics education and the philosophy of education. Both examine knowledge based on reason. And rational. Moreover, concurrently seek the truth in the field of education and discuss phenomena in education. Based on the discussion above, it can be concluded that the philosophy of mathematics and science education goes together to discuss the phenomenon of education and truth in education. Philosophy and science are bridges over developments in science and technology, including the 21st century, the millennial era, and revolution 4.0. The philosophy of mathematics and science education complement not to be contradicted but complement each other.

4. CONCLUSION

The philosophy of mathematics and science education goes together to discuss the phenomenon of education and truth in education. Philosophy is the knowledge that looks for something authentic in life about what, how, and who. Mathematics is the knowledge that teaches about thinking logically, critically, systematically, and studying pattern regularity. Mathematics education is learning about what can measured, and science knowledge is a system of knowledge obtained from the results of examinations carried out carefully using a particular method. The philosophy of mathematics and science education complement each other not to be contradicted but complement each other.

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AUTHOR'S CONTRIBUTIONS

The authors discussed the results and contributed to from the start to final manuscript.

CONFLICT OF INTEREST

There are no conflicts of interest declared by the authors.

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