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The Relation Between Mathematics Philosophy and Culture-Based Learning Model

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ABSTRACT

This study aims to study the correlation of mathematical philosophy with cultural-based learning models. The method of research used is the method of library research, i.e. conducting studies related to mathematical philosophy, philosophical mathematics learning, culture-based mathematic learning, the connection of mathematical philosophers with ethnomathematics, and the relationship of mathematic philosophies with cultural-based learning models. The results of the research have been obtained that the philosophy of maths, the model of learning based on culture, and ethnomathematics have close connections in the context of understanding and teaching of Mathematics. Mathematical philosophy deals with the foundations of mathematical epistemology and ontology, while a culture-based learning model emphasizes the integration of values and cultural contexts in mathematics learning. Ethnomathematics refers to the study of mathematical ways of thinking in a particular culture. By understanding the cultures, traditions, and world views of a particular society, ethnomathematics can help develop more culturally relevant and meaningful learning models. Therefore, the interrelationship between mathematical philosophy, culture-based learning models, and ethnomathematics can create a more holistic and contextual approach to mathematics learning.

***Keywords**: mathematical philosophy, cultural-based learning model, ethnomathematics*

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INTRODUCTION

Philosophy is regarded as a view of life because it contains human cultural values that are considered to be true by society and made as guidelines for life in society. These values of culture play an important role in the implementation of human activities, these values become the measure of life in the society. So it is from it that man or society is expected to carry out whatever is contained in the philosophy itself. Philosophy is called science because philosophy contains four scientific statements: how, why, where, and what. (Ginting & Situmorang, 2008; Anwar, 2015; Susanto, 2021). Philosophy is important to be adhered to and studied in the world of education, it is relevant because philosophy can solve problems related to education and the life of the community around it. The philosophical approach to the science of education encompasses thinking about the purpose, meaning, and values of education. The philosophy of education helps formulate the moral and intellectual foundations of the educational process. It becomes a reference for teachers to the importance of learning and understanding the philosophy of education properly and correctly. Mathematical science is the field of knowledge that studies structures, spaces, and abstract relationships through concepts such as numbers, patterns, and changes. Mathematics has wide applications in various fields, including science, technology, economics, and so on. Philosophy and mathematics are interrelated, this is because philosophy is the foundation or foundation of a science while math is considered the mother of all sciences. Mathematical philosophy is a branch of mathematics that aims to reflect on and explain the nature and foundations of Mathematics. Mathematical philosophy helps answer fundamental questions about the existence, and the truth of mathematics.

A learning model is a conceptual framework used as a guideline in conducting learning that is systematically structured to learning objectives concerning syntax, social systems, reaction principles, and support systems. (Joice&Weils). A learning model is a conceptual framework that describes a systematic procedure in organizing learning experiences to a specific learning objective and serves as a guideline for learning designers and teachers in planning and implementing learning activities. (Ibadullah Malawi & Ani Kadarwati, 2017). A learning model is a planning or a pattern used as a guideline in planning learning in a classroom or a tutorial. (Trianto, 2013). A learning model has a syntax (specific sequence) a learning model is a pattern that describes a sequence of whole stages that are generally accompanied by a series of learning activities (Lefudin, 2017). (Jumanta, 2016). Based on the above description, it can be concluded that the learning model is a set of guidelines or teaching plans in learning that are structured or designed systematically to organize learning experiences to learning goals.

Formally, culture is defined as an order of knowledge, experiences, beliefs, values, attitudes, meanings, hierarchies, religions, time, roles, relationships of space, concepts of the universe, objects of matter, and property acquired by a large group of people from generation to generation through the efforts of individuals and groups. (Deddy Mulyana dan Jalaludin Rahmat, 2013). The cultural-based learning model is an approach to learning that involves the culture, habits, and customs of the community as one of the

elements or part of the learning. Cultural-based learning is important to be applied so that students do not forget the customs of the society, and the norms of life contained in the culture itself. Learning is facilitating something that society considers to be true, enabling something good to be applied in social life, done repeatedly until it eventually becomes a habit in society. Ethnomathematics was first introduced by D'Ambrosio, a Brazilian mathematician in 1977. Ethnomathematics is one of the forms of cultural learning in the context of mathematics. (Wijayanto, 2017). This article was written to discuss the relationship between mathematical philosophy and cultural-based learning models.

Theoretical Studies

The word philosophy is derived from the Greek words philos (love, love) and sophia (wisdom). A person who applies philosophy is called a philosopher, which means a lover of wisdom. Philosophy has been said to be a science because it contains four scientific statements: how, why, where, and what. (Ginting & Situmorang, 2008; Anwar, 2015; Susanto, 2021). Question how to contain properties that can be captured or seen by the senses, answers which can be descriptive. Question why contains a cause (or origin) of an object, the answer obtained is quality. What is the knowledge of the past, the present, and the future? The knowledge that is gained is derived from what is repeated and can be used as a guideline, the knowledge contained in the customs or habits of the society, and the knowledge that arises from the guidelines used (the law) as a thing to be held. The question is whether to ask about the truth or the absolute value of something, the answer that is obtained is knowledge of things that are very general, universal, and abstract. Thus it can be concluded that philosophy and mathematics have a close relationship with each other, this is because philosophers are the basis of knowledge for studying other sciences, while math is a science that has many relationships with other sciences in other words it is said that math is the mother of various sciences.

Mathematical philosophy is a branch of mathematics whose objective is to consider and explain the essence of Mathematics, that is to say, to describe the realities of Math in the intellectual world as a whole ((Ismail et al, 2022). The task of the mathematical philosophy is to provide a systematic and absolute foundation for the knowledge of mathematics, i.e. the value of the truth of Mathematics (Ernest, 1991). (Wahyudin, 2014). The philosophy of mathematical education emphasizes planning, implementation, and evaluation in mathematics education. (Atmaja, 2020). Ahmad & Saparwadi (2018) stated that "mathematics is a field of science with different characteristics when compared to other fields of science. A mathematical learning process will be influenced by its deductive reasoning, i.e. an idea or abstract concept that is structured hierarchically." Trianto (2007) argues that: "A learning model is a pattern used as a guideline in the planning of learning in class or tutorial learning. A learning model according to Joyce (in Trianto, 2009: 22) is a planning or pattern used as guidelines in planning learning in the class or learning in a tutorial and to determine learning devices including books, movies, computers, curricula, and others. (Trianto, 2015). The role and functions of the learning model (Rosmala, 2021) are: 1) Helping

teachers generate changes in student behavior; 2) Helping the teachers in creating a suitable environment; 3) Constructing interaction between teachers and students; 4) Assisting the teacher in designing curricula or curriculum; 5) Offering ways in distributing teaching material so that it is interesting and effective; 7) Helping educators in developing innovative learning.

Culture is an exciting concept. Formally, culture is defined as the order of knowledge, experience, beliefs, values, attitudes, meanings, hierarchies, religions, time, roles, space relations, concepts of the universe, material objects, and possessions acquired by a large group of people from generation to generation through the efforts of individuals and groups. (Deddy Mulyana dan Jalaludin Rahmat, 2006:18). A culture-based learning model is an approach to learning that involves the culture, habits, customs, and customs of the community as one of the elements or parts of learning. Cultural-based learning is important to apply so that students do not forget the customs of society, and the norms of life contained in the culture itself. Learning is facilitating something that society considers to be true, enabling something good to be applied in social life, done repeatedly until it eventually becomes a habit in society.

Ethnomathematics was first introduced by D'Ambrosio, a mathematician in Brazil in 1977. Ethnomathematics is one of the forms of culture-based learning in the context of mathematics. Ethnomathematics is analogous to the lens to view and understand mathematics as a cultural or cultural product. (Wijayanto, 2017). Ethnomathematics refers to the study of mathematical ways of thinking in a particular culture. By understanding the cultures, traditions, and world views of a particular society, ethnomathematics can help develop more culturally relevant and meaningful learning models.

This article was written to discuss the relationship between mathematical philosophy and cultural-based learning models. The discussion of this article will begin with the relationship of philosophy with mathematics, then the relationship between mathematical philosophies and ethnomathematics, and the relationship between mathematic philosophers and culture-based learning models.

METHOD

This arithmetic is a library research (Library Research). Library research is research activity carried out through the collection of data or information with the help of various materials available in the library such as reference books, articles, previous research results of similar, notes, as well as various journals relating to problems to be solved. (M.Sari dan Asmendri, 2018). The data used in this article are sekunder data from accredited scientific articles or journals, books of philosophy, books related to learning, and mathematics. As regards the steps taken in library research (Library Research) are as follows: (1) Establishing research topics, at this stage then the researchers establish research themes i.e. the relationship between mathematical philosophy and culture-based learning model; (2) Looking for literary studies that support this research, researchers look for source data from accredited national articles or journals along with books related to education philosophy, mathematics philosophies and cultural-based model learning; (3) Clarify the focus of the research study, respectively

the research focus is on the study of the linkages between Mathematical Philosophy with culture- based learning model, (4) Look for the necessary references and determine which references are suitable for research studies; (5) Read and make important notes related to research studies, (6) Include research references; (7) Create a report in the form of articles entitled The difference between the mathematic philosophie and culture based model learning.

RESULTS AND DISCUSSION

Mathematical Philosophy

Philosophy can create a balance of knowledge, attitudes, skills, and socialization abilities. So philosophy can make human beings not only cognitively intelligent but also have a good attitude. (Fairus et al., 2023). Philosophy plays an important role in solving problems in the world of education. (Gayatri, 2022). Mathematical philosophy is a branch of mathematics that aims to reflect on and explain the nature of Mathematics, in other words, mathematical Philosophy aims at explaining the position of math in the intellectual world as a whole (Haris et al., 2022). (Ernest, 1991). (Handoko et al., 2022) studied the values of mathematics in mathematical learning from the point of view of the philosophy of humanism. The results of the study have shown that the combination of mathematical values in the philosophy of humanism in the process of learning mathematics can shape the character of students.

Philosophy-based Mathematical Learning

Learning in mathematics is closely related to philosophy in its implementation. (Haris et al., 2022). This statement is in line with a study conducted by Fedi et al (2021), which studies mathematical learning with humanistic philosophy. The study finds that humanistic philosophy is very needed in the learning process because it can enhance the innovation and creativity of students, and improve the construction of the understanding of the mathematical concepts of students. This can happen because of the process of learning based on humanism, students are not distinguished one from the other, learners are treated as people as a whole, have their abilities and uniqueness, and students have the same opportunity to improve their competence. The implementation of the humanist philosophy in mathematical learning can cultivate the values of mathematics so that it can shape the personality of students. (Handoko et al., 2022). Asmara (202) and Rani (2022) studied the application of the philosophy of constructivism to mathematical learning. The results of the study show that constructivism is one of the philosophical currents that has much to do with mathematical learning. The application of this constructivism to the learning process is that students are required to be active in learning. The purpose of this application is that the student can build his mathematical concepts from the understanding of the student. The position and correlation of philosophy in mathematical learning are seen in ontology, epistemology, and methodology of mathematics. Teachers must be able to link abstract mathematical concepts to real-life contexts that are easy to understand by students. Epistemology relates to the source of mathematics knowledge and how it is acquired. Methodology is related to the approaches and methods used by teachers in teaching math.

Philosophy forms the foundation of understanding and approach to learning mathematics.

Culture-Based Mathematical Learning

Culture-based mathematical learning encompasses the integration of values, traditions, and cultural contexts in mathematics teaching. It allows students to associate mathematical concepts with their cultural realities, making learning more relevant and exciting. This approach also promotes a deeper understanding as students can see the application of mathematics in their daily cultural context, creating a more meaningful learning experience. Ethnomathematics is one of the forms of culture-based learning in the context of mathematics. Ethnomathematics is analogous to the lens to view and understand mathematics as a cultural or cultural product. (Wijayanto, 2017). (Priyanti, 2022) developed an ethnomathematics module with a Joyful Learning approach to the Dayak culture. The results of the study showed that students had difficulty solving long stories without pictures compared to stories using pictures. It was concluded that mathematical concepts would be easier to understand by students when accompanied by local cultural images. Rizkitania and Arisetyawan (2021) researched mathematical learning on flat buildings using ethnomathematics-based snake game applications. Research has found that ethnomathematics-based mathematical learning media can motivate students to learn mathematics through culture. Based on the above two studies, it can be concluded that ethnomathematics makes a positive and important contribution to the learning process of mathematics in the classroom.

Relationship of Mathematical Philosophy with Ethnomathematics

The link between mathematical philosophy and ethnomathematics lies in the understanding and recognition that mathematics is not only universal but is also shaped and influenced by cultural contexts.

1. Understanding the nature of mathematics: Mathematical philosophy questiones the nature and foundations of Mathematics, including the question of whether it is universal or depends on a cultural context. Ethnomathematics also emphasizes that Mathematica is not universal, but is shaped by a cultural and social context. Both recognize that Mathematicians can differ in different cultures and contexts.
2. Acknowledgement of cultural diversity: Mathematical philosophy and ethnomathematics both recognize the importance of appreciating and respecting cultural diversity in the context of mathematics. Mathematics emphasizes that culture can influence mathematical development, while ethnomathematics studies and appreciates the contribution of culture to the development and understanding of mathematics.
3. Critical thinking of mathematical concepts: Mathematical philosophy and ethnomathematics both encourage critical thinking about mathematic concepts. Mathematic philosophy involves critical thought about the nature and foundations of mathematicians, while ethnomathematics encourages critical thinking about mathematics concepts in a particular cultural context.
4. Use of cultural context in mathematical learning: Ethnomathematics uses cultural context as a resource for learning and teaching mathematics. This approach allows students to associate mathematical

concepts with their own experiences and cultures, thus making learning mathematics more relevant and meaningful. Mathematical philosophy also recognizes the importance of cultural contexts in mathematical understanding and can provide a philosophical foundation for ethnomathematics approaches.

Thus, mathematical philosophy and ethnomathematics complement each other in understanding and teaching mathematics related to cultural contexts. Both acknowledge that mathematics is not only universal but also influenced by cultural and social contexts.

Relationship of Mathematical Philosophy with Cultural Based Learning Models

Mathematical philosophy and culture-based learning models have close links in the context of teaching and learning mathematics. Mathematical philosophy deals with the properties of mathematics, such as abstraction, certainty, and uncertainty. This understanding can help in designing learning models that take into account mathematical characteristics themselves. 2. Recognition of cultural diversity: The mathematical philosophy and the culture-based learning model both acknowledge the importance of appreciating and respecting cultural diversity in the context of learning mathematics. The mathematical philosophy emphasizes that mathematics is not universal, but can be influenced by a cultural context. A culture-based learning model takes a similar approach by acknowledging that students have a different cultural background and integrating cultural elements into mathematic learning to enhance relevance and relevance.

3. Comprehension of constructivism: Mathematical philosophy and culture-based learning models both have a strong understanding of construtivism in mathematical learning. Constructivism emphasizes the importance of building understanding and knowledge of mathematics through active interaction between students and their environment. A culture-based learning model uses a constructivist approach to integrating cultural elements into mathematical learning so that students can build a meaningful and contextual understanding of math.

4. Critical thinking and reflection: Mathematical philosophy and culture-based learning models both encourage critical thought and reflection in mathematical learning. Mathematic philosophy involves critical thinking about the nature and foundations of mathematics, while culture-based learning models encourage students to question, analyze, and reflect on their experiences and knowledge in a cultural context. Both encourage the students to think critically about mathematics and connect it to their cultural contexts.

By combining mathematical philosophy and culture-based learning models, mathematics teaching can become more relevant, meaningful, and attentive to student cultural diversity. It can enhance student motivation, participation, and understanding of mathematics learning.

CONCLUSION

Mathematical philosophy, culture-based learning models, and ethnomathematics are closely linked in the context of understanding and teaching mathematics. Mathematic philosophies deal with the fundamentals of mathematical epistemology and ontology, while culture-based learning models emphasize the integration of cultural values and contexts in mathematical learning. Ethnomathematics refers to the study of

mathematical ways of thinking in a particular culture. By understanding the cultures, traditions, and world views of a particular society, ethnomathematics can help develop a more relevant and culturally meaningful learning model. Therefore, the interrelationship between mathematical philosophy, culture-based learning models, and ethnomathematics could create a more holistic and contextual approach to mathematics learning.

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