Media e-Comic Mathematics Based on Contextual Teaching and Learning in the Perspective of Educational Philosophy

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Abstract: This research is motivated by learning media, a series of learning processes involving educators and students, and learning resources. Learning resources can be in the form of learning media that are more modern and follow students' characteristics to support learning and build a new atmosphere in student learning activities, such as developing media that uses the internet and digital technology as a means of operation. Thus, this underlies the researcher to study Contextual Teaching and Learning (CTL)-based mathematical e-comic media from the perspective of educational philosophy. Educational philosophy has a significant role in shaping the characteristics of mathematics learning media. In the philosophy of education, several aspects and dimensions form the basis for making mathematics learning media, namely aspects of ideas and facts, as well as abstract and concrete dimensions both theoretically and practically. Ontological, epistemological, and axiological educational philosophy approaches in developing mathematics learning media can form practical values that lead to abilities or learning outcomes. The type of research used is library research. Moreover, axiology in the development of mathematics learning media can form practical values that lead to abilities or learning outcomes. The type of research used is library research. Furthermore, axiology in the development of mathematics learning media can form practical values that lead to abilities or learning outcomes. The type of research used is library research.

1 INTRODUCTION

Education is a science. Science is the knowledge that is systematically arranged based on scientific principles. So, the science of education is a science that discusses the general problems of education as a whole and in the abstract. There are characteristics of knowledge that are said to be science, including The first feature, namely that science has its object of study, which can be divided into two kinds, namely material objects (for example, humans) and formal objects (for example science that discusses human behavior).

The second feature is that science has specific methods/procedures that can be used to study science itself. And the third feature is that science material must be presented systematically, meaning that the knowledge is arranged coherently so that it is easy to learn (for example, background to the problem).

Regarding the grouping of knowledge, Sutari Imam Barnadib and Piet A. Sahertian argued that according to the system, knowledge (knowledge) is divided into two groups, namely: Education as pure science, which can be said to be independent of experience and stand-alone like mathematics; and Education as an applied science, which cannot leave experience for either its existence or its development (Imam Barnadib, 1994).

Applied science is applying knowledge from one or more fields: mathematics, physics or environmental science, chemistry, or biological sciences for solving practical problems that directly affect our daily lives. Philosophy is said to be a science because philosophy contains four scientific statements: how, why, where, and what.

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The answers obtained are descriptive in asking nature what can be captured or seen by the senses (Ginting & Situmorang, 2008). The question of why contains an object's cause (origin), with the answers, obtained being of quality. Where questions ask about what happened in the past, whether about a thing's nature or absolute value, the answer obtained is knowing things that are very general, universal, and abstract.

In the world of education, related to learning and learning philosophy of science is a series of approaches to ways of thinking that guide the direction of the development of the world of education. A series of learning processes involve educators, students, and learning resources, both those the school has provided and those that educators deliberately make. Learning resources in the form of learning media are made by educators to support learning and build a new atmosphere in student learning activities. One of the learning media that can be developed is e-comic.

Amelia Putri (2022) states that e-comics and comics are generally almost the same. The difference is in terms of usage. Comics are printed to look like books, while e-comics are electronic comics that use digital technology such as cell phones and computers.

The development of learning media certainly requires a learning model that will shape the media's characteristics following the expected practical goals. The learning model in educational philosophy is a significant factor in directing the orientation of making learning media, such as in learning mathematics which tends to use media to help illustrate abstract concepts so that they are easily understood.

2 METHOD

The method used in writing this article is the library research method. A literature study is a technique that is carried out by conducting studies by collecting references from books, articles, magazines, newspapers, and online media.

The references that have been collected are then sorted according to the topics to be discussed. In the literature study, a synthesis is also carried out, namely re-describing in their language the opinions or theories of experts contained in reference sources.

The preparation of this article uses references obtained through online media, such as website pages, blogs, articles, modules, and electronic books.

3 RESULTS AND DISCUSSION

3.1 Definition of Philosophy and Mathematics

Several figures expressed different opinions about the meaning of philosophy, and these figures were: (1) Plato, who stated that philosophy is the science of obtaining pure truth; (2) Aristotle stated that philosophy is a science of studying reality. Furthermore, (3) Rene Descartes stated that philosophy is a set with a base of investigation about God, nature, and humans. From the definition stated above, it can be concluded that philosophy is a science that seeks the truth value of the essence of a problem.

The word mathematics comes from the Latin word mathematic, initially taken from the Greek word mathematics, which means study (Rahma, 2013). This word originates from mathematics, which means knowledge or science (knowledge, science). Mathematics is also related to words almost the same, namely machine or mathenein, which means learning (thinking). So, based on the word's origin, mathematics means knowledge obtained by thinking (reasoning). Mathematics is a primary science benchmark for developing and progressing science, technology, and philosophy (Ulfa, 2019).

Philosophy and mathematics do not doubt that from the past until now, these two fields of knowledge are very closely related. Philosophy of mathematics is a branch of philosophy that examines mathematics's philosophical assumptions, foundations, and effects. The philosophy of mathematics aims to provide a record of the nature and methodology of mathematics and to understand the place of mathematics in human life. The field of knowledge called the philosophy of mathematics results from philosophical thought whose goal is mathematics.

Slamet (2008) explains the details of the field of philosophy of mathematics that can be put forward and are expected to be more systematic, including several sections, namely: (1) Mathematical epistemology, namely the theory of knowledge whose study target is mathematical knowledge; (2) Mathematical ontology, recently ontology is seen as a theory of what exists; (c) Mathematical axiology, consisting of ethics which discusses aspects of truth, responsibility and the role of mathematics in life, and aesthetics which discusses the beauty of mathematics and its implications for life which can affect other aspects, especially art, and culture in life.

3.2 Relationship Between Mathematics and Philosophy of Education

Mathematics and philosophy are two terms that cannot be separated. Philosophy and mathematics have a close relationship. Wahyudi (2011) argues that the relationship between mathematics and philosophy is the earliest intellectual attempt to understand the world around us, and both were born in Ancient Greece and underwent necessary transformations there. Mathematics is a crucial case study for philosophers. The contemporary philosophical agenda has very clear formulations focused on mathematics, which include epistemology and Ontology.

3.3 CTL-Based Mathematical e-Comic Media Development Foundation

Learning mathematics learning media is used to help smooth communication and interaction between teachers and students so that learning activities and achievements in mathematics are more optimal. Mathematics learning media can be created using written, audio, visual, or combination.

Philosophy of science and education has a significant role in shaping the characteristics of mathematics learning media (Komariah, 2019). The development of mathematics learning media requires a philosophy of science and education approach consisting of ontological, epistemological, and axiological approaches. Ontologically, the development of mathematics learning media is based on reality following the conditions or circumstances that occur in the classroom. In contrast to the ontological approach, the development of mathematics learning media which is carried out epistemologically, emphasizes the scientific method, which consists of (1) the existence of a systematic, logical, and consistent framework of thinking; (2) requires a hypothesis based on a framework; (3) requires verification of the hypothesis made. From an axiological point of view,

Based on ontological, epistemological, and axiological approaches, mathematics learning media has practical goals for learning mathematics.

One of the media that educators can develop is e-comic media. In general, e-comics and comics are almost the same, and usage is different. Comics are printed to look like books, while e-comics are electronic comics that use digital technology such as cell phones and computers.

Comics have advantages and disadvantages when applied as a medium of learning (Sutrisno, 2018). The following are the advantages of comic media, including (1)comic media can increase students' motivation and interest in learning; (2) create fun learning; (3) students will never forget the experiences they experience and make a memorable impression on them; (4) the material explained in comics is more interesting because it contains story pictures and illustrations that make it easier for students to understand the subject matter. Meanwhile, the disadvantages of comic media are (1) not all students can learn in a visual style; (2) most students tend only to want to see and are curious about the attractiveness of the picture.

According to MS Gumelar, quoted by Nuriza S (2018: 33), there are several design elements in comics which include: (1) Space is space in comics such as paper, space on the canvas, space in digital media such as computers or laptops; (2) Image is an image, photo, illustration, logo, symbol, and icon that forms a comic; (3) Text is a symbol of sound in the comic; (4) Color is the color in comics (S., 2018).

According to Annisa Aura (2021), the completeness of comic elements consists of three parts, including (1) the front, which consists of a cover accompanied by a comic title and credits or a description of the comic's author; (2) the content section, consisting of panels, reading or word balloons, narration, gutter or separation between panels, and sound effects; (3) the end, contains a summary of the story or conclusion.

The e-comic media used should use a learning model that allows students to know theoretical knowledge and more on contextual knowledge so that students can more easily construct their own knowledge, such as the contextual teaching and learning (CTL) learning model. According to Nurdyansyah (2016), CTL is a learning concept that helps students relate the material being taught to real-world situations of students and makes connections between the knowledge they have and its application in everyday life, such as in the family, school, and community environment.

The Directorate General of Elementary and Basic Education in Kokom Komalasai (2013) explains the seven components of CTL, namely: (1) constructivism, which builds knowledge that is owned and then expanded; (2) inquiry, namely the knowledge and skills of students obtained from the results of self-discovery; (3) asking questions, namely obtaining the knowledge that students have starting from asking questions; (4) learning community, namely learning outcomes obtained from the cooperation between one student and another student; (5) modeling, namely presenting examples of

situations in learning; (6) reflection, namely thinking backward about what has been learned before; (7) the actual assessment, namely the assessment of the results of the learning process.

Ontological, epistemological, and axiological approaches to the philosophy of science and education in developing e-comic mathematics learning media, if summarized following their practical purposes, can form practical values that lead to abilities or learning outcomes. These practical values can be in the form of (1) abstract concepts that can be understood concretely; (2) complex object messages can be shown to be similar to their original conditions; (3) students can interact actively; (4) students' perceptions become uniform; (5) students' learning motivation increases; and (6) the consistency of delivering information is more effective and repeatable. These practical values will be achieved if the selection of mathematics learning media is carried out correctly, so it is necessary to consider the conditions of students, learning objectives, and the characteristics of the media used. It will be outstanding in helping the learning process be effective, efficient, and productive.

4 CONCLUSIONS

Education as a science is classified into 2: Education as a pure science and Education as an applied science. Philosophy of science is the basis for the development of mathematics learning media, especially for choosing media development according to the ontological, epistemological, and axiological approaches. This approach is oriented to the practical goals of media development, which is oriented to the practical values obtained after the mathematics learning media is applied.

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