

Creative Thinking Based on Technology in Mathematical Problems

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Abstract—This article is a preliminary study for research to improve technology-based creative thinking in mathematical problems. This is a step taken to address the concerns of parents of students and teachers of the adverse effects of technology on the development of education, especially the development of student learning achievements today. In this case a learning system is needed to improve student achievement. Some of the use of technology that is considered important in improving students' creative thinking, especially in the field of mathematics are learning systems using visual video in the delivery of material in the learning process and the use of mathematical applications. The research method used in this study is a qualitative research method in the form of literature studies. From some previous research articles, it was concluded that the delivery of material using visual video and using applications in solving mathematical problems, it can provide experiences that approach the actual atmosphere so students can be more creative in solving mathematical problems.

Keywords: *creative thinking, mathematical problems, technology*

I. INTRODUCTION

The development of technology now is not only very helpful in daily activities but is also a scary phenomenon especially for parents of students. This is because there are many students who abuse technology development. One phenomenon that is reported every day by the mass media is the number of minors or school-age children who are treated in mental hospitals due to addiction to online games. As educators, it is very sad to see a phenomenon like this so that it takes a positive action in utilizing technological developments, namely by utilizing technology in the learning process to improve student achievement. In this case, Miarso [1] states that one of the factors influencing or supporting the achievement of a quality learning system in an effort to achieve educational goals, including using or utilizing information and communication technology in the process of education and learning. Furthermore Latuheru [2], revealed

that by using the quality of education can be improved and the learning process can take place appropriately.

The development of educational technology and its supporting infrastructure and efforts to improve the quality of education above, among others, can be done through the use of educational technology in the process of learning mathematics by using mathematical applications. Mathematics application is a learning model that can facilitate educators and students to learn more broadly, more and also more varied. Through this application, students can learn and practice in developing their creative thinking. The material they can learn is also more varied, not only in word form, but can be richer with visual variations.

Learning is essentially a process of interaction between the teacher and students, both direct interaction such as face-to-face activities or indirectly by using various learning media. Based on the differences in interaction, learning activities can be carried out using a variety of learning patterns.

II. RESEARCH METHODOLOGY

This study using qualitative research methods, which are intended to get answers related to opinions, responses, perceptions or description of words. The descriptive research chosen is the type of literature study which is a study of the previous research literature. As stated Nazir [3] that data collection techniques by library research refer to the technique of collecting study studies of literature books, notes, and reports related to the problem being solved related to informal evidence in learning mathematics .

Furthermore the data analysis technique is using the Miles and Huberman model analysis technique. In this case Miles AND Huberman [4], argues that the activities in qualitative data analysis are carried out interactively and take place continuously until they are finished, so that the data is saturated. The size of data saturation is characterized by no longer obtaining new data or information. Activities in the

analysis include data reduction, data display, drawing conclusion and verification.

III. RESULTS AND DISCUSSION

Creative thinking is an ability to think consistently and continuously in an effort to produce a creative / original work that is in accordance with objects or ideas that are already in our minds, which are processed in a real way. La Moma [5] states that in mathematics Creative thinking can be seen as an orientation or disposition about mathematical instructions, including the task of discovery and problem solving. These activities can lead students to develop more creative approaches in mathematics. These assignments can be used by teachers to improve students' abilities in matters relating to the dimensions of creativity. Furthermore, According to Nurmasari et al. [6] Creative thinking in mathematics and in other fields is part of life skills that need to be developed, especially in the face of the information era and increasingly competitive atmosphere. Individuals who are given the opportunity to think creatively will grow healthy and be able to face challenges. Conversely, individuals who are not allowed to think creatively will become frustrated and dissatisfied. The development of creative activities is to involve imagination, intuition and discovery by developing divergent, original thinking, curiosity, making predictions and guesses and experimenting.

Nehe et al. [7] states that ability Mathematical creative thinking is the ability to think mathematically included with authenticity, elaboration, flexibility and fluency. Characteristics of creative thinking namely originality, elaboration, fluency and flexibility. So that children's creativity can materialized is needed to encourage individuals (intrinsic motivation) and environmental drive (extrinsic motivation). From some of the statements above conclude that for understanding mathematics requires the ability to think creatively and the results of thought creatively encourages students to be actively involved in learning mathematics school.

Semiawan [8] explains that Creativity is the ability to give new ideas and apply them in problem solving. Creativity includes both aptitude characteristics such as fluency, flexibility (flexibility), and originality in thought, as well as non-aptitude characteristics, like curiosity, happy to ask questions and always want to search new experiences.

According to Hamruni [9], one alternative is to improve abilities Student thinking is to encourage questions that can stimulate thought process. In this sense the concept of the problem or questions used to bring up the "culture of thinking" in students. Evans [10] and Siswono [11] explains that creative thinking is a mental activity to make continuous relations, so found "right" conditions or until someone gives up. According to Siswono [11] creative thinking is a habit from sharp thinking with intuition, moving the imagination, expressing (to reveal) new possibilities, unveiling (unveil) ideas amazing and inspiring unexpected ideas.

Some Technological Based Learning Models that can enhance students' creative thinking are as follows: Drills Models, Tutorial Models, Simulation Models, Instructional

Games Models. This model has been applied by several schools in the learning process.

The drill model is one of the technology-based learning models by training students to the subject matter that has been given. According to Sudjana [12], Drill method in teaching can train students' dexterity or skills in the material that has been learned. Through the drill model certain habits will be instilled in the form of training. With continuous practice, it will be embedded and then it will become a habit. In addition to instilling habits, this model can also add speed, determination, perfection in doing something and can also be used as a way to repeat the material that has been presented. Can also increase speed. This model is derived from the Herbart learning model, which is an association model and responses replication. Through this model it will strengthen the response of lessons to students. Implementation is mechanical to teach various subjects and skills.

Tutorial model is learning in the form of providing guidance, assistance, guidance, direction and motivation so that students learn efficiently and effectively. Providing assistance means helping students learn the subject matter. Tutorial program is a learning program used in the learning process by using software in the form of a computer program that contains subject matter.

The simulation model is basically one of the learning strategies that aims to provide a more concrete learning experience through the creation of imitations in the form of simulations.

From the results of the literature study, combine technology-based learning models that can enhance students' creative thinking by taking the following steps: Classes begin with a brief introduction, then the teacher presents how to solve problems with the application. After that students then work on their own problems with the application (e.g. maple application), both independent and in groups, while being watched by the teacher who goes around to see developments and provide suggestions. After a few minutes or after the completion of the application is obtained, students are assigned to complete it manually then asked to present what they have obtained in front of the class, thus we will get different creative completion steps but with the same results.

IV. CONCLUSIONS

Technology-Based Learning Model is basically a learning model that aims to provide a concrete learning experience through the creation of imitations of experiences that approach the real atmosphere. This learning experience can improve the ability of student learning outcomes, in this case increase students' creative thinking skills in solving mathematical problems. From the results of this literature study, it is expected that a teacher can utilize technology that is easily absorbed by students in the form of the application of computer-based learning, using software or visual video.

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