Utilization of Scratch in Mathematics Learning on Students' Computational Thinking Ability

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Abstract

To realize *Indonesia Emas* where today there has been digitalization in various field, so it is necessary to have computational thinking skills through mathematics learning. In learning mathematics, a learning media that is relevant to computational thinking skills is needed, namely Scratch. The purpose of this study is to conduct a literature study on the use of Scratch as a learning mathematics media for students' computational thinking abitilies. This research method is a literature study with three stages, namely organizing, synthesize, and identify . Based on the results and discussion, it is found that the Scratch as a mathematics learning media has a very large influence on students' computational thinking abilities. This is shown by development of computational thinking skills through Scratch as media for learning mathematics. The suggestion of this research is needed more research on the use of Scratch in mathematics learning on students' computational thinking abilities in order to provide more innovative and optimal result.

Keywords:

Computational Thinking, Mathematics Learning Media, Scratch.

1.   Introduction

It takes effort to form *Indonesia Emas* 2045 at this time. Because in that year there has been a very rapid development of technology. This happens in every sector of life. Start from the economic sector, education, community services to employement. So that the term computational thinking ability emerged, this ability involves thinking related to the digital world. So that efforts are needed to answer new challenges for the Indonesian people regarding these capabilities. Therefore, computational thinking skills are needed as capital achieve *Indonesia Emas* 20145.

Through learning process in class, computational thinking ability can be developed to support the achievement of *Indonesia Emas* 2045. The process and development of students' computational thinking this time will determine the fate of Indonesian nation in a digital future. One of lessons that can support students' computational thinking skills is mathematics learning. As in the opinion of Sanapiah & Aziz (2020), mathematical problems can be solved through computational thinking skills. This is in a line with Mufidah (2018), computational thinking skills will be comparable to students' mathematical abilities, because in mathematics there are logical and systemic thinking abilities that have the same way of working in compiling algorithms in the field of computing. Thus, there is a relationship between learning mathematics and the development of computational thinking skills in students.

Because the computational thinking can be achieved through thematematics learning process, it is necessary to have a media that can support the development of computational thinking in mathematics learning. One of the media that can support this is Sratch, according to Dewi et al. (2021) said that there was a big influence and improvement on computational thinking ability with Scratch media. Comparable to Scratch as a learning media, Sutikno (2019) argues that Scratch is a simulation program used to design, develop, and analyze which displayed in the form of moving animations to demonstrate the functions or

basic principles of learning. So, this Scratch media is very relevant and suitable if it is a media for learning and developing computational thinking skills.

The urgency of computational thinking ability to form *Indonesia Emas* 2045 can be solved with an innovative effort, namely through a mathematics lesson using Scratch media. This learning is expected to improve students' computational thinking skills on mathematics learning with Scratch as learning media. With the increase in students' computational thinking abilities, it will have an impact on *Indonesia Emas* 2045.

2.   **Discussion**

2.1.   *Computational Thinking*

Computational thinking is a skill that enables students to think abstractly, algorithmically, and logically, and is ready to solve complex problems (Yuntawati, Sanapiah, & Aziz, 2021). Computational thinking is defined as a set of problem-solving thought processes that originate in computer science but can be applied in various disciplines through problem-solving processes (Yadav et al, 2017). Computational thinking is a problem solving process include formulating problems, organizing and analyzing data logically (includin through abstraction processes, such as models and simulations), identifying, analyzing, and implementing solutions with the most effective and efficient steps (Barr et al, 2011). So, computational thinking is an ability that involves logical thinking in solving a problem with certain algorithms or stages.

In computational thinking, there are several indicators that are needed. According to Liem (2018), the indicators of computational thinking ability have four parts, the following is an explanation table:

Tabel 1. Computational Thinking Ability Indicators

Indicator	Information
Decomposition	Breaking complex problems into simple or small parts
Pattern recognition	Looking for common patterns between problems or within the problems
Abstraction	Focusing on important information and ignoring less relevant details
Algorithms	Build solution steps on the problem

2.2.   *Mathematics Learning*

Computational abilities can be developed through various disciplines, one of which is mathematics, namely through thinking skills consistingof a coherent process with clear steps and procedures (algorithms), calculations (computing), determining the right strategy, and being oriented to problem solving (Cahdriyana & Richardo, 2020). Through mathematics learning, computational thinking skills can be trained with the help of learning media, namely scratch. In the study conducted by Wulandari et al.

(2021), it was stated that the use of scratch media can train students, computational thinking skills especially in terms of accuracy and critical thinking skills.

Computational thinking in mathematics learning includes the process of pattern recognition, abstraction, generalization. Pattern recpgnition is the skills of identifying, rcognizing and developing patterns, relationships or similarities to understand data as well as strategies used to understand data and strengthen abstract ideas. Abstraction is making meaning from the data that has been found and its implications. While generalization is solving new problems based on solving previous similar problems (Csizmadia, et al, 2015). Because there are indicators of computational thinking ability in mathematics learning, it can be said that mathematics learning has a big role in developing computational thinking skills.

2.3.   *Scratch*

Scratch is a visual-based programming language with a drag and drop concept that uses code block shaped like a puzzle to make it easier for users who want to learn programming principles through animation projects and fun games (Zahid et al, 2021). According to Pratiwi & Bernard (2021), Scratch is programming language which is easily understood by beginners and can be used as a media in the form of games, quizzes, animations, and others. In the formation of algorithms in Scratch, logical thinking is needed. So that this media is suitable if applied in learning mathematics. Even more, according to Chaerunnisa & Bernard (2021) Scratch is very suitable to be a media for learning mathematics.

2.4.   *Utilization of Scratch in Mathematics LearningAS Learning Media*

Combining computational thinking ability indicators that are related to mathematics learning is a good solution for developing computational thinking skills. In learning mathematics, a media that supports this is also needed, Scratch can be a solution. According to Dewi, et all (2021), Scratch-assisted computational thinking learning trains computational thinking skills to construct concepts. This is also supported by the opinion of Aulia (2021) which states that learning mathematics with the computational thinking method has a very good quality.

The implementation of Scratch can be used in the fiture of Scratch or make a program in it. Either make program or use the fiture, we have to make some algorithm to make it. So, it is relevant to computational thinking skill.

The use of Scratch as a learning media is proven to have a good effect on computational thinking abilities. Thus, this innovation is expected to be a solution in efforts to develop computational thinking capabilities for *Indonesia Emas* 2045.

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3.   **Conclusion**

Based on the results and discussion, it is found that Scratch as a mathematics learning media has an effect on the development of students' Computational Thinking abilities. Scratch allows students to make simple algorihtms logically, which is related to learning mathematics which requires students to think logically in solving problems through Scratch. The formation of the algorithm will later become a factor in the development of students' Computational Thinking abilities. By examining the use of Scratch as a media for learning mathematics, it is related to the ability of Computational Thinking so that it can be used as a solution in developing computational thinking abilities. The suggestion from this research is that further research is needed regarding the use of Scratch as a media for learning mathematics by paying attention to indicators of Computational Thinking Ability in each learning activity..

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