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TikTok Platform to Train Middle School Students' Computational Thinking Skills in Distance Learning

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ABSTRACTS

The competence of students in Indonesia is still in a low rank based on their problem-solving and reasoning abilities. The pandemic condition forces distance learning to hinder the improvement of students' abilities if there is no innovation in learning that can help students to always be motivated in learning. This study aims to determine the effectiveness of using TikTok as a learning media innovation to train computational thinking skills, especially in the distance learning process. The research method uses a quantitative approach with the target of 9th-grade junior high school students. The results of the study showed that the post-test average of students was 89.3%, increasing 32.2% from the pre-test results which only reached 57.1%. This shows that short videos uploaded through TikTok can be an effective and innovative learning media.

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1. INTRODUCTION

In PISA (Program for International Student Assessment) study organized by the OECD (Organization for Economic Co-operation and Development), the results of the global education evaluation in 2018 showed that Indonesia was in the 7th lowest position in terms of reading, mathematics, and science. This shows that the problem-solving and reasoning abilities of students in Indonesia are still very low (Augie & Priatna, 2021). This is an urgency for students in Indonesia, especially at the high school level to be able to compete with other countries (Lestari & Annizar, 2020).

Students must be prepared to have a capable in facing the challenges of the next 10 to 20 years (Maulidiyah & Anistiyasari, 2020). So that the quality of students' thinking must be improved based on the needs of the current digital reform era. There are skills that are urgent to have today, namely computational thinking skills. This competency can be the key in the 21st century, where in this century life's problems are increasingly complex but the solutions can be solved through a digital approach. Even to learn computational thinking skills, you can now take advantage of existing digital media without knowing the boundaries of space and time.

Computational thinking skills are able to help students in making decisions and solving problems. In Danindra (2020) it is revealed that computational thinking is a cognitive skill that allows students to solve complex problems into small steps, define patterns, create and organize a series of steps to provide solutions and build data representations through simulation (Danindra, 2020). Therefore, learning about computational thinking is one of the important competencies for students, especially to adapt to future technology (Anistiyasari et al., 2020). The development of computational thinking competence for students was proclaimed into a curriculum by the Minister of Education, Culture, Research, and Technology Nadiem Makarim in 2020. However, this concept requires a long process and creative-innovative ideas in its application. Especially with the continuation of the Covid-19 pandemic until now, a learning from home policy has been implemented to break the chain of the spread of Covid-19.

The application of learning from home does not go well, on the contrary it renders difficult for teachers and students. Students' interest in learning decreased slightly because learning from home was not fun. Many students show a decrease in motivation which is marked by being late in collecting assignments and not understanding the explanation of the material given online by the teacher (Hayati, 2020). From these problems, a refresher is needed in the learning process. Based on this study, the solution offered is to use audiovisual media in the form of videos uploaded to the TikTok platform.

Learning videos given to students are considered effective because they can be used by various generations and viewed repeatedly without the teacher having to explain repeatedly. Especially when distance learning sometimes students are constrained by the network, so the presence of videos makes learning more flexible (Fadillah & Maryanti, 2021). TikTok is a social media platform from China that is in demand by the majority of generations Z and Y who have an age range of 14-24 years (Dewi et al., 2020). However, there is no research that discusses the use of TikTok platform as a learning media to train students' computational thinking skills.

This study aims to see the extent to which the use of learning videos uploaded to the TikTok application can train the computational thinking skills of junior high school students. Using pre-experimental quantitative methods, this study was conducted on 14 students as research samples with a one-group pre-test and post-test design containing 10 questions about computational thinking.

2. THEORETICAL FRAMEWORK

2.1. Computational thinking

Computational thinking or computational thinking was first introduced by Seymour Papert in 1980 and then pioneered by Jeannette Wing in 2006. Computational thinking according to Wing (2008) is a thinking process in which formulates problems and expresses solutions in such a way that computers, humans, or machines can work effectively (Wing, 2008). So that CT is a useful thinking skills to solve problems in various fields.

As shown in **Figure 1**, CT consists of four components, those are: 1) decomposition as a breakdown of the problem into small steps, 2) pattern recognition to find repeated patterns in each problem solving, 3) abstraction to find one main information in the problem. problem solving, and 4) algorithm design as a systematic step of problem solving (Andrian & Hikmawan, 2021). In the world of education, computational thinking is a conceptual framework that engages students in meaningful learning so they are able to develop skills that can be applied in a variety of situations (Barr *et al.*, 2020).

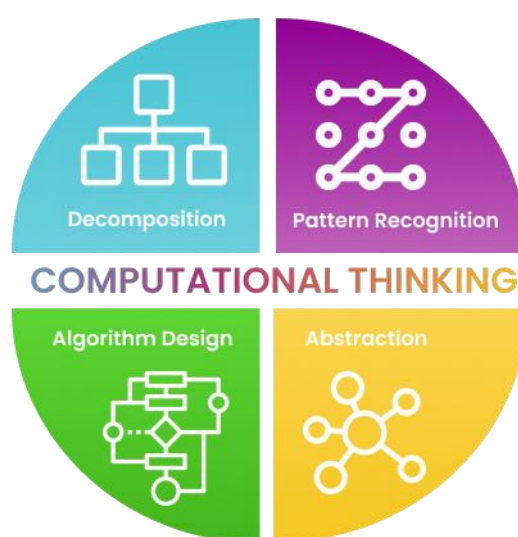


Figure 1. Computational thinking components.

2.1. Distance learning

Distance learning is an interactive learning between a teacher and a student that can run outside the educational institution, so the information and knowledge from its sources can be reached by the students through technical support and electronic media (Lassoued, 2020). This kind of learning can be the main model of learning or an alternative when studying inside the institution is limited due to certain conditions.

Looking at the requirements of the market, distance learning has emerged as a new learning model to support the propagation of knowledge in a more agile way, facilitate the access of learning that can be obtained anytime and anywhere (Costa *et al.*, 2020). In Pakpahan (2020) distance learning aims to meet educational standards by utilizing Information Technology using computer devices that are interconnected by educators and students so that through the use of technology, teaching and learning process can still be carried out properly (Pakpahan *et al.*, 2020).

3. METHODS

This research was conducted as part of community service program with the aim of increasing student literacy. The research took place in Badan Perguruan Indonesia (BPI) Junior High School Bandung, Indonesia. In this study, the literacy raised was scientific literacy related to computing as in the targeted school there were Information and Communication Technology (ICT) subjects. This is in line with how this study leads to train one of problem solving skills which close to the field of computer science or information technology.

As shown in **Table 1**, the research method was carried out using a quantitative pre-experimental approach (one-group pre-test post-test) on 14 students consist of 5 male students and 9 female students from the 9th grade. The design of this study was arranged that the subject is given a pre-test, namely O_1 , X is the treatment carried out, then O_2 is a post-test given after the subject was treated. (Rosdianto & Murdani, 2017). Pre-test and post-test consist of 10 questions which are multiple choices.

Tabel 1. One-group pre-test post-test design.

Pre-test	Treatment	Post-test
O_1	X	O_2

4. RESULTS AND DISCUSSION

4.1. Demographics

The research was conducted at Badan Perguruan Indonesia (BPI) Junior High School Bandung, Indonesia. Determination of the sample is done by asking the vice principal for the curriculum, who then chooses one class to contribute as the research sample from the 9th grade. Of the 28 students who were asked to take part in the activity, only 14 were present when the activity took place, consisting of 5 male students and 9 female students. They are part of Z generation, who are actively using social media so they are familiar with TikTok platform. They also learned information and technology at school, so they didn't feel strange of computing. Based on the teacher's explanation, they are active and sociable students, some are quite smart and diligent.

Based on it, no one has special problems so they don't mind taking part in this research. Before the learning activity, we had a little discuss with the students. We saw that four male and female students were very active, two of them gave their opinions regarding the purpose of this research. The rest follow the activity but are inactive and turn off the webcam. We don't force them to turn on the camera because they might have signal problems.

4.2. Phenomena in the learning process

The research process as in the distance learning period is carried out online. The activity was using Zoom as a virtual classroom, TikTok as a learning content storage platform, and google form for giving pre-test and post-test questions. Students are directed to fill out questions on google forms, then study learning materials independently through the TikTok platform. For students who don't have an account on the TikTok platform, we provide a link that can be opened via web browser. There are no obstacles during the activity.

The activity was carried out in 3 sessions, in which the first session was giving pre-test questions using google form, the second session was giving learning material in the form of videos that were watched through the TikTok platform, and the last session was giving post-test questions. The pre-test and post-test questions are designed with multiple choice,

consisting basic questions listed in the learning video. The results of the data from the pre-test and post-test will be compared to obtain conclusions from the study.

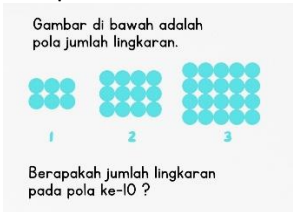
4.3. Data analysis

Table 2 describes the comparison of the results of pre-test and post-test scores based on the questions given. The pre-test questions are given before the students get the learning material, so the answers given are depending on students' limited knowledge. It is different with the post-test questions that are given after students study independently related to computational thinking by listening to learning materials through short videos uploaded to the TikTok platform. The post-test questions given are the same questions to be able to compare the value of students' knowledge before and after learning.

The basic questions posed on the pre-test and post-test questions lead to how students' ability to define the concept of computational thinking, describes the steps that are components of computational thinking, trains logical reasoning by computational thinking approach, and discovers how to apply the steps of computational thinking in solving a problem as illustrated and explained in detail inside the video that has been uploaded.

The comparison is also illustrated as shown in **Figure 2**. The graph clarifies the data in the table. The graph shows the comparison between the average pre-test and post-test scores that have been carried out by students as also included in the table. Based on the direction, the straight line is towards the upper right which shows the increase of the average value. These two data presentations can be examined more clearly and the results discussed in the next section.

Table 2. Students' pre-test and post-test results.

Number	Question	Pre-Test	Post-Test	Gain
1.	What is Computational Thinking?	78.6%	100.0%	21.4%
2.	Computational Thinking consists of 4 steps: Decomposition, Pattern Recognition, Abstraction, and ...	28.6%	92.9%	64.3%
3.	The meaning of Decomposition is...	57.1%	92.9%	35.8%
4.	The meaning of Abstraction is...	64.3%	85.7%	21.4%
5.	The meaning of Pattern Recognition is...	78.6%	92.9%	14.3%
6.	Approximately how long will it take to solve the questions below: 	42.9%	78.6%	35.7%
7.	Can the above problem be solved with a formula?	71.4%	85.7%	14.3%
8.	How is the first process of decomposition of the questions above?	42.9%	71.4%	28.5%
9.	Is the right way to solve the problem is to draw a circle up to the 10 th pattern?	35.7%	92.9%	57.2%
10.	Is the result of the problem above is Pattern 10 = 11 x 12 = 132 ?	71.4%	100.0%	28.6%

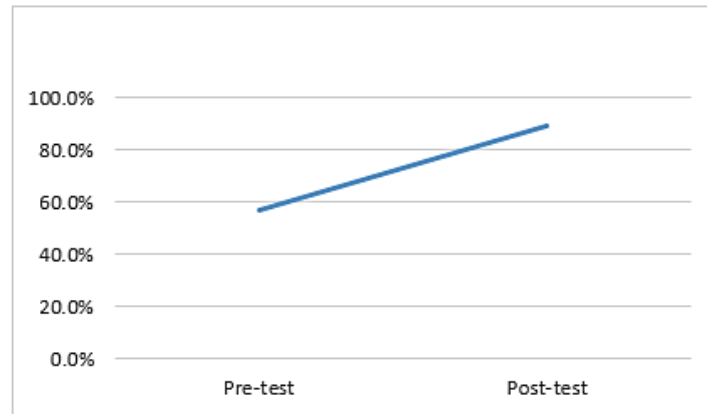


Figure 2. The increased of average in pre-test and post-test results.

4.4. Discussion

The discussion points from the results of the pre-test and post-test are as follows:

- (i) Students' knowledge of general concepts of computational thinking increases, so that students are more familiar with what computational thinking is.
- (ii) Students' reasoning and problem solving skills can be further trained as computational thinking is a competency that supports both skills.
- (iii) Short audio-visual media uploaded through the latest platform, TikTok, can increase student motivation which leads to higher grades.

Results show the average ability and knowledge of students related to computational thinking as a whole when given pre-test questions is 57.1%. After being given learning media content about computational thinking using TikTok media, the average number increased by 32.2% to 89.3%. With this increasing number, short learning videos uploaded through the TikTok platform can be a learning media to train students' computational thinking skills. This is in line with research on Ananda (2017) that learning materials by utilizing audio-visual media can increase student motivation which has implications for improving learning outcomes (Ananda, 2017).

5. CONCLUSION

Computational thinking is an important competency possessed by students. With the help of digital technology, learning computational thinking skills can be done anytime and anywhere. The results showed that the results of the post-test of students increased by 32.2% to 89.3%, as the results of the pre-test which only reached 57.1%. This average increase shows that short videos uploaded through the TikTok platform can be a learning media to train students' computational thinking skills in distance learning process.

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7. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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