

# Analysis The Effect of Minds-On Activity on The Computational Thinking Ability of Early Childhood Student

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## Article Info

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## ABSTRACT

CT (Computational Thinking) involves solving problems, forming systems, and understanding human behavior by drawing basic concepts to science, CT is also included as a thinking tool that reflects the breadth of the field of computer science. This generation familiarity with technology helps to form a solid background for understanding the key to underlying concepts of computing. Hands-on activity and Minds-on activity refer to active learning which means that a person combines physical activity with mental activity in terms of learning. Hands-on activities and Minds-on activities are most effective when used to focus and encourage students to be physically involved while learning. When students are physically and mentally engaged, they activate the different parts of their brain. The research method used is a qualitative method.

**Keywords:** computational thinking; hands-on activity; minds-on activity

DOI: <https://doi.org/10.20961/joive.v4i3.58589>

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## 1. INTRODUCTION

Computational Thinking (CT) abilities are skills that need to be trained from an early age, providing students with expertise in technology that will benefit them in the future [1]. What must be considered so that children develop according to their age stage is to direct, and guide them by building positive characters in children and balancing all aspects of their development [2]. Childrens are also able to apply their knowledge and experience in new concepts and are able to show their creative attitude in solving various problems in the form of perception, ideas, or in the form of work products. The development of early childhood education really needs support from all parties, including parents, the environment and also teachers [3]

CT involves solving problems, forming systems, and understanding human behavior by drawing basic concepts to science, CT is also included as a thinking tool that reflects the breadth of the field of computer science [4]. This generation familiarity with technology helps to form a solid background for understanding the key to underlying concepts of computing. One of the technological capabilities is the ability of programming languages. Programming study is to learn about problem solving, then pouring it in a certain notation that is easy to read and understands [5]. Activities that can help in computational thinking activities are called Minds-on activities.

In simple terms, Hands-on activity and Minds-on activity refer to active learning which means that a person combines physical activity with mental activity in terms of learning. Hands-on activities and Minds-on activities are most effective when used to focus and encourage students to be physically involved while learning. When students are physically and mentally engaged, they activate the different parts of their brain. Minds-on activities are activities that focus on core concepts that introduce students to build thinking processes and encourage them to ask questions and seek answers that can increase their knowledge and thus students gain understanding [6]. The study of media technology course is chosen for the implementation of mind-on activities in this research. In accordance to the indicators of competency achievement, students are able to create learning media that are in accordance with the learning themes presented [7]. As a learning media used to facilitate learning, namely using the scratch application. Citing from the official page at [scratch.mit.edu](http://scratch.mit.edu), scratch is a project of the Lifelong Kindergarten Group at the MIT Media Lab, Scratch helps students create and compose their own programs, games and animation. Scratch helps students(young people) to think creatively, think systematically and work collaboratively Learning technology courses are courses that study the development of educational curricula and the use of technology for the world of education. In this course,

students are expected to be able to present learning media in accordance to the purpose that not only to discover student skills but also mastery of concepts in making learning media.

## 2. RESEARCH METHOD

The research method used is a qualitative method. According to Lexy J. Moeleong [8] qualitative research methods are research that intends to understand the phenomena experienced by research subjects. The research approach used is a case study. Data analysis is a process that must be carried out in a research procedure. The analysis carried out is adjusted to the research carried out by using a qualitative approach. In qualitative and descriptive research, it was developed on the basis of events obtained during field activities. Because, the activities of data collection and data analysis cannot be separated from each other. Miles and Huberman describe the process of analyzing qualitative research data as follows.

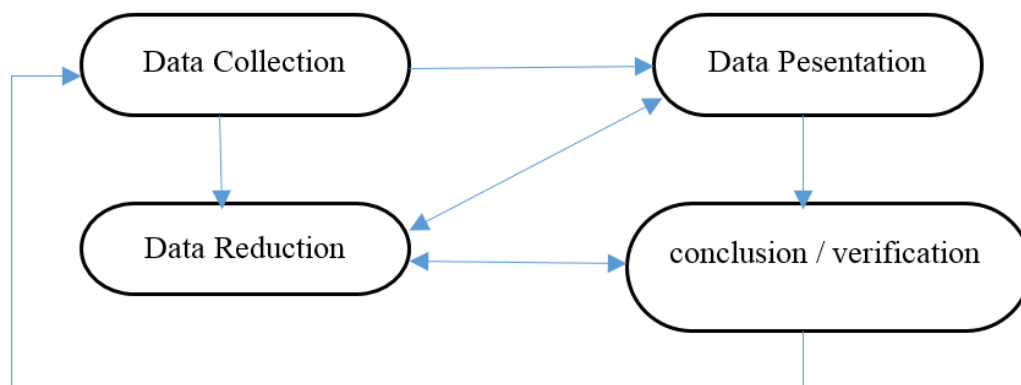


Figure 1. Qualitative data analysis process.

## 3. RESULT AND ANALYSIS

### 3.1 Research Subject

Determination of research subjects in this study using the method of selecting the sample objective. This is done so that research can be centered on resource persons who have the appropriate capacity to meet the research objectives. The participants in this study are as follows:

Table 1. Participant

Participant	Semester	Game has been created	Learning Engineering Course
P1	7 <sup>th</sup> Semester	Catching fish	✓
P2	7 <sup>th</sup> Semester	Fish eating game	✓
P3	7 <sup>th</sup> Semester	Learning video with scratch	✓
P4	7 <sup>th</sup> Semester	Maze game	✓
P5	7 <sup>th</sup> Semester	Game up and down (fish)	✓
P6	7 <sup>th</sup> Semester	-	✓
P7	7 <sup>th</sup> Semester	Maze Soccer	✓
P8	7 <sup>th</sup> Semester	Transportation theme	✓
P9	7 <sup>th</sup> Semester	-	✓
P10	7 <sup>th</sup> Semester	Uderwater theme and telling story with scratch.	✓

Table 1 shows that there were 10 participants (named P1 to P10) who came from semester 7 where all participants had taken the learning technique course as a condition for conducting this research. The table also (besides participants P6 and P9) shows some games or learning media that have been made by the participants.

## 3.2 Interview result

Tabel 2. Identify scratch

Question 1	How to recognizing scratch?	Keyword	Classification
P1	I know about scratch because there is a course on making learning media with scratch application so I know this application	Course	Identify
P2	From a lecturer during an ICT course	Course	Identify
P3	Through learning media courses given by the lecturer. In addition, other social media can be used as references or references in using scratch.	Course	Identify
P4	The scratch application is used in one of the courses, namely information and communication technology in PAUD, students are divided into several groups to make simple games	Course	Identify
P5	When there is a course, namely Information and Communication Technology in early childhood, students are asked to download the scratch application and apply it as an assignment and finally we learn about the scratch application	Course	Identify
P6	During the ICT-based AUD Learning Media Development course where the lecturer provides material in the form of using the Scratch application, a learning media for early childhood and making game products from the application as an early semester end exam.	Course	Identify
P7	I found out about web scratch when I took a learning media course. Scratch can be a very interesting learning media for early childhood. Scratch is the right coding application for children to trust to hone their child's problem-solving cognition.	Course	Identify
P8	When in 5th semester there was a Digital Learning Media ICT course, one of the applications used was Scratch Jr	Course	Identify
P9	Introduced by one of the PG-PAUD Lecturers in the ICT-Based Early Childhood Learning Media Development course	Course	Identify
P10	I know the Scratch application because this application is included in the ICT-based learning media development course in 5th semester	Course	Identify

From table 2, it is found that participant P2 who has fewer sentences in explaining how participants know the scratch application has the same conclusion as participant P6 who explains in detail. It can be concluded that despite the various opinions of the participants above, all of them are well acquainted with scratch through the lecture material, namely the Development of ICT-based Early Childhood Learning Media.

From table 3, it is found that although participant P4 did not explain clearly, participant P4 was able to add features in the scratch application. Likewise with participants P1, P2 and P3 the participants were able to add features even though they did not explain in detail how to add the icon. In contrast to participants P5 – P10 who explained in detail where the icon was located, how to use it, it was also confirmed that they were able to add features in the scratch application. Participants P5-P10 even though the five participants explained in detail, the methods used were different for each. Based on the work of the participants, it can be seen that participants P1 - P10 showed abstraction skills. Participants can easily find features / icons for adding sprites, blocks and backgrounds. Especially for participants P8 and P10 who were able to find patterns of adding sprites, blocks and backgrounds with conditions such as adding custom sprites.

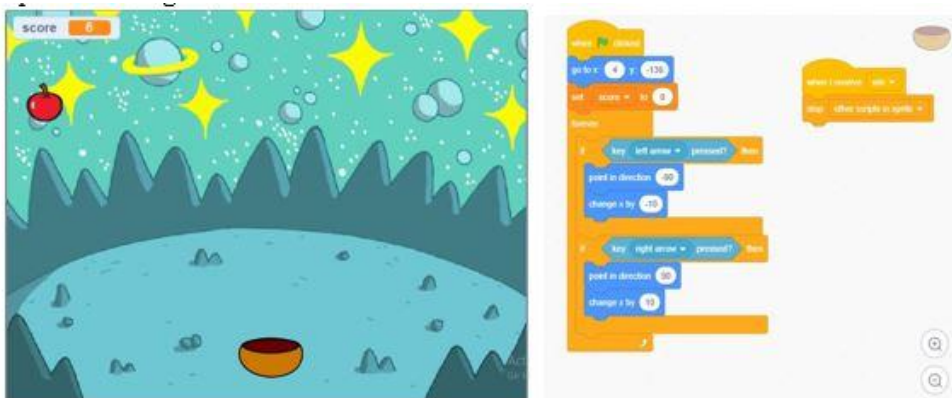
Tabel 3. Add Fitur

Question 2	Add fitur and block	Keyword	Classification
P1	In the lower right corner, there is a picture of a cat's head, then click on the bottom of the search image, then there are many choices, I usually type .. select the green flag say hello.. you can also use the one that says hello and how many seconds.	Capable	Familiar
P2	To add a sprite, in the right corner there is an image of a cat and the plus sign is clicked then search for the sprite you want, you can scroll it. As for deciding to add a block, yesterday I saw that there was a code that was red, purple, etc. I scrolled initially I clicked the green flag below it added "Hello" for 2 seconds etc"	Capable	Familiar
P3	usually custom, if there is one, just take what is there... or usually find your own picture or if you have a friend you can design it. Make a selection of the image first then code in one of the gmabras, enter the code and set how many minutes	Capable	Familiar
P4	in the lower right corner there is an added sprite, I click the search on that button.	Capable	Familiar
P5	in the lower right corner there is an image of a cat, click on it, a box will appear and then an animation will appear. To add blocks, initially the cat is added "when the green flag starts" then enter say "hello" for a few minutes then add the left one again.	Capable	Familiar
P6	in the application on the side there are three custom options, new custome and sound, so I chose that. I'm working on it while looking for a tutorial. Try trying to enter it initially even after that select looks because the conversation continues to say, adjust accordingly. If you click on the one with the cat's face, then you can add sprites.	Capable	Familiar
P7	If you want to change the model, click on the backdrop. On the desktop there are no fox sprites so I moved to the web. Choose the one whose coding starts with a green flag and then gives the appearance and then is greeted with hello.	Capable	Familiar
P8	to add an image in the left corner, there is a create sprite with a cat icon and a plus sign then several themes such as anime will appear or all of them are searched for what we want later. To add a block to the fox sprite, there must be a greeting with the cat. , at first the fox turned his back on the cat, initially I used a custom fox to turn to face the cat and sat down to add to the writing I used the purple code then search for say then we write what we want to say then set the time.	Capable	Familiar
P9	icon at the bottom left of the cat's head if you want to search for the default or existing one. We can also draw our own or we can upload it. add block select broadcast message plus display say hello.	Capable	Familiar
P10	on the left there is a sprite image then select a new sprite. You can make it yourself but you have to be able to draw. The green flag uses motion to walk, if for words use appearance, if there is sound, use sound. I used the display and then I added the sound. If my cat adds a meow, my fox is random.	Capable	Familiar

Tabel 4. bugs and Instructions

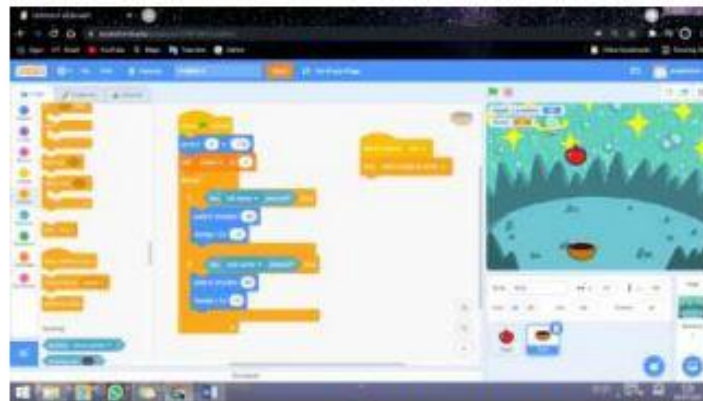
Question 3	Instructions	Keyword	Classification
P1	If there's a clue, I'll do it right away, because I'm still trying out the tool. Yesterday's instructions did not understand at all..	Incapable	Unskilled
P2	If there's a clue, I'll do it right away, because I'm still trying out the tool. Yesterday's instructions did not understand at all..	Capable	Unskilled
P3	confused about making a description.. easy to understand but I don't know how to write it myself. but understand what it means. There is a bug	Incapable	Unskilled
P4	easy to understand but the practice is a bit forgotten but I understand. There's a bug. The apples are coded for all directions if the bowl can go right to left. The left side of the bowl is behind the bowl, if the apples are x -90, the rotation should be removed so that the bowl stays up. I understand the instructions but in practice I can't	Capable	Unskilled
P5	-	Incapable	Unskilled
P6	I'm looking for a googling reference. if still confused I ask a friend. what I understand is clicked and then a polygon appears and then because I can't find the octagon and pentagon buttons, I draw my own	Incapable	Unskilled
P7	there is a bug in the bowl, the right arrow is clicked, the bowl is upside down. Solution: the rotation is rotated up so that if you click it it doesn't turn upside down. I understand but I can't make the button yet so I just made a pentagon	Incapable	Unskilled
P8	-	Incapable	Unskilled
P9	I read first until I understand then try. Open the app directly create	Capable	Skilled
P10	I opened the tutorial on YouTube, there is a bug bowl if it's upside down on the left. You don't have to rotate, you don't have to go into coding. If it's number 11. There is a button when you click on it, it will appear an octagon and a pentagon.	Capable	Skilled

From table 4, it was found that although all participants were able to add features in the scratch application, not all participants were able to master scratch programming. The following is a display of the given blocks and the blocks that were found bugs and found solutions.



Pict 1. Given test picture

Pict 1 is a block image that is given to be tested into the *scratch* .



- Terdapat bug yakni mangkuk/ bowl saat diarahkan ke arah kiri maka posisi mangkuk akan terbalik. Supaya mangkuk tidak terbalik maka koding 'point in direction' pada Sprite bowl dihapus.

Pict 2. Picture of found bugs and solution

Pict 2 is the result of work from P10 sources who managed to find bugs and provide solutions so that the bugs were resolved. For Participants P1 – P8 found a bug but could not overcome or find a solution, while for P9 was able to find a solution but had difficulty writing it into scratch programming. Based on the work of the participants, it can be seen that participants P1 - P10 show that the algorithm's ability has not been covered well. Participant P9 did well until the decomposition stage but was not good enough to show the ability of the algorithm. Meanwhile, participant P10 showed the ability to decompose well, supported by the results of interviews that presented statements that supported the results of the questionnaire above. Then the P10 participants were able to demonstrate the ability of the algorithm well. See how participant P10 uses blocks and no error code is found.

#### 4. CONCLUSION

The results of interviews with 10 participants showed the ability to think computationally. All of them have been able to show the results of computational thinking in their work. The visible differences are the style/character in answering questions, as well as in adding work (features, finding solutions, receiving instructions) to the ten participants who have been interviewed. Some participants still need help while some participants are able to do it independently. In doing abstraction, some participants need help with video tutorials from one platform. Of the ten participants, the ten participants were able to perform abstraction skills well. Although in a different way but it does not pose a problem. Then in doing the decomposition and algorithm only participants P9 and P10 did well. Participants P9 and P10 were able to demonstrate the arrangement and use of the algorithm.

Abstraction ability in computational thinking, they do their job differently. In the process, the ten participants stated that when they found a problem, the participants looked for material that showed the problem and when they still encountered problems, the participants admitted that they were looking for solutions with the help of lecture material notebooks and the internet (news search platforms and video platforms). With the discovery of these facts, . In accordance with what Clever (2012) stated that the ten participants were judged to have shown their minds-on activity according to what was needed.

#### ACKNOWLEDGEMENTS

I am especially grateful for Mr. Cucuk Wawan Budiyanto and Mr. Rosihan Ari for constructive criticism and advise of my article.

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