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# The Implementation of Scratch Application in Mathematics Learning

**Sri Imawati, M. Arif Shubchan**
Muhammadiyah University of Jakarta
Faculty of Science Education
Jalan. KH. Ahmad Dahlan Cirendeu Ciputat Timur
Immawati83@gmail.com

**Abstract** - This research entitled the implementation of scratch application in mathematics learning. This research is motivated by various kinds of problems related to the students's difficulty to understand mathematics and the students who quickly feel bored with the monotonous learning media. This study aims to determine whether scratch application is able to help in facilitating the students in learning process. The method used in this study is qualitative descriptive with a case study approach. The sample in this study is 4.2 grade students of Labschool FIP-UMJ primary school in Muhammadiyah University of Jakarta. Data collection techniques used in this study are observation, interviews, and field notes. Based on the data obtained, the finding of the research showed that the use of the scratch application as a learning media proved to be effective in helping students to understand the mathematics subjects. The finding of this study are expected to be the benefit to the parties involved in it, especially in the education field.

***Keywords:*** *Scratch application, Math, Qualitative method.*

## 1. Introduction

Education is a process where someone is taught to develop their potency. As stated in Indonesian Constitution No. 20 of 2003 concerning National Education System Chapter I, concerning the general provisions of article 1 paragraph (1), which states that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their inner potential to have religious spiritual power, self-control , personality, intelligence, noble character, and skills needed by himself, society, nation and state.

The learning process is an activity that will produce a change of self, both actual and potential. These changes will get a new ability or skill. Therefore, the learning process in each individual is very important because through learning, people know their environment and adjust themselves to the surrounding environment. This is because, learning will produce changes in a person, from those who do not know to know or who cannot become able. In formal education, learning shows that there are positive changes so that in the final stages there will be new skills, skills and knowledge. The results of the learning process are reflected in learning achievement.

Based on these facts, the researchers are interested in analyzing how to facilitate learning mathematics for elementary school students through the scratch application. Researchers want to conduct the research at the Labschool FIP UMJ Primary Schools located on Jalan KH. Ahmad Dahlan Cirendeu Ciputat Timur South Tangerang by taking the research entitled The Implementation of Scratch Application in Mathematics Learning.

After presenting the background, the formulation of the problem of this study is:

1. How do you apply the Scartch application to fourth grade students at Labschool FIP UMJ primary school?
2. How to make it easier to study grade IV students through scratch application at Labschool FIP UMJ primary school?
3. Does the use of the scratch application as a learning media facilitate learning process of fourth graders at Labschool FIP UMJ primary school?
4. How does the student's response to the scratch application become a learning media in class IV Labschool FIP UMJ primary school?

## 2. Literature Review

Juansyah (2015: 02) explained that application understanding is a program that is ready to be used which is made to carry out a function for application service users and the use of other applications that can be used by a target to be addressed. According to the executive computer dictionary, applications have the meaning of solving problems that use one of the application data processing techniques that usually race against a desired or expected computation as well as the expected data processing.

Hansun (2014: 41), stated that language programming was created by the MIT Media Lab from the Massachusetts Institute of Technology. Scratch is a programming language designed to introduce the concept of computer programming in a simple way so that it can be understood by anyone from various backgrounds. Scratch displays an interface that is very simple and easy to use. The concept of scratch programming is visualized in the form of program blocks such as installing a puzzle. Scratch can be used to create applications, animations and games. In addition, scratch also makes it easy for students to understand the concepts of mathematical logic and computers, with scratch the concept of programming can be understood easily and fun.

Tekerek and Altan (2014: 133), scratch is one of the highly dedicated coding software for children starting from the ages of 8 to 16 years. Coding scratch itself is very simple, scratch users don't have to type coding and have to master programming-programming languages like basic, java, c ++ and others. Scratch users just need to master the logic of a project that they want to work on. Furthermore, scratch users do not need to feel difficulty in coding, because in writing their own coding scratch users are placed in a very structured display with characters who want to move according to their wishes. Scratch users just need to put in a simple coding script that we can combine with others to suit their desires.

According to Martanti et al (2013: 19) the scratch program has the advantages and the disadvantages. The advantages of this program are as follows.

1) Scratch-based animation media can be run online or offline.
2) Scratch-based animation media can run on a multiplatfrorm operating system.
3) Scratch-based animation media can run on all web browsers.

The weakness of the scratch program is as follows.

1) To run offline, additional programs are needed in the form of database programs and web servers.

2) To find out the activity of users, especially students when using scratch-based animation media, a user activity record is required.

According to Skinner in Suryadi (2011: 2), to strengthen students' understanding of what has been learned, then after the stimulus-response process, which among others is in the form of question and answer in the teaching process, must be continued by providing reinforcement, among others, in the form of exercises . Thus the dominant learning theory used in the implementation of the 1968 mathematics curriculum was Skinner's learning theory.

According to Wood in Ekawati and Saragih (2018: 55), some students' difficulties in learning mathematics are:

1) Difficulty distinguishing numbers, symbols, and building space.
2) Unable to remember mathematical propositions.
3) Writing unreadable numbers or small sizes.
4) Not understanding mathematical symbols.
5) Weak abstract thinking skills.
6) Weak metacognition ability (weak ability to identify and utilize algorithms in solving mathematical problems).

Based on some of the opinions above, it was concluded that the mathematics learning difficulties experienced by students differed from difficulties related to concepts, difficulties related to principles, difficulties in using symbols, difficulties due to weak student calculations and difficulties in understanding mathematical language.

## 3. Research Methods

In this study, the researchers used qualitative research methods. Margono (2010: 35), states that qualitative research approaches use hypothetico logic verification. The approach begins with deductive thinking to reduce the hypothesis, then conduct testing in the field. The conclusions or hypotheses are drawn based on empirical data, thus the leatherative research emphasizes more on empirical indexes and measurements. Qualitative researchers feel "knowing what is unknown" so that the designs they develop are always a priori and definitive activity plan.

Sukmadinata (2015: 60) revealed that qualitative research (Qualitative Research) is a research aimed at describing and analyzing phenomena, events, social activities, attitudes, beliefs, perceptions, thoughts of individuals individually or in groups. Some descriptions are used to find the principles and explanations that lead to conclusions. Qualitative research is inductive, where researchers allow problems to arise from data or be left open to interpretation. Data is collected by careful observation, including descriptions in detailed contexts with in-depth interviews, and results of analysis of documents and records.

According to Sugiyono (2012: 15) qualitative research methods are research methods based on the philosophy of postpositivism, used to examine the condition of natural objects, (as opposed to experiments) where the researcher is a key instrument, data source sampling is done purposively and snowball, collection techniques with triangulation (combined), data analysis are inductive / qualitative, and the results of qualitative research emphasize the meaning rather than generalization.

In this research, in order to obtain actual data from the field, the authors use data collection techniques as follows:

**1) Observation**

Hadi in Sugiyono (2015: 203) suggests that observation is a complex process, a process composed of various biological and psychological processes. In this case the author observes students, infrastructure and others as well as filling in the observation sheet attachments as supporting data.

**2) Interview**

According to Esterberg in Sugiyono (2012: 317) states that interviews are a meeting of two persons to exchange information and ideas through questions and responses, resulting in communication and joint construction of meaning about a particular topic.

**3) Field Notes**

According to Afrizal (2015: 152) field notes are very important in qualitative research if researchers collect data with in-depth interview techniques, involved observations, and focus group discussions. This is because the field record is a place to store data to be analyzed by researchers.

## 4. Research Findings and Discussion

Labschool FIP UMJ Primary School is an educational institution established to meet the needs of the surrounding community for elementary school education. Labschool FIP- UMJ primary School is managed by professional staff in their field under the supervision of FIP-UMJ lecturers. In this educational institution, children are stimulated by various media and methods to develop their abilities, knowledge and skills by prioritizing, appreciating, commitment, confidence, cooperation, creativity, curiosity, independence, integrity, and tolerance to children.

The name of this Primary School is Labschol FIP UMJ, standing on a land area of 1700 M2. This building is self-owned and the building area is 762 M2 with IMB number 684.3 / 1365-DTRB / 2003, and notarial deed number on June 19, 1968 no. 71. Primary schools that have been accredited A in 2015 are on Jalan KH. Ahmad Dahlan Rt. 002 Rw. 003 Cirendeu Ciputat Timur South Tangerang Banten Province.

This research is a meaningful study where researchers will interpret the research as a whole. Talking about scratch as an application that helps facilitate math learning in students at Labschool FIP UMJ primary school, has an in-depth and open discussion. Therefore, researchers interpreted from several data collection techniques that researchers have done, including observation techniques. The results of observations that researchers did at the Labschool FIP UMJ were quite good. Learning activities and also the use of scratch that the researchers did at the FIP UMJ Labschool went smoothly. Observation techniques are data collection techniques that have an important role. Where this technique researchers witnessed as a whole directly. Researchers are aware and confident that what researchers see is not a lie, pretense or engineering.

Then based on the results of the interviews of researchers with Labschool FIP UMJ teachers that began on November 8, 2017, which took place in the teacher's room and also in the hallway to the second floor of the Labschool FIP UMJ, the researchers were convinced by the teacher's answer. Where clearly the teachers describe or explain the condition of students when learning, whether there is an increase in learning, the use of media as a means of learning and so

on, so that researchers know all that is needed to write and describe the conditions of students in class 4.2 Labschool FIP UMJ.

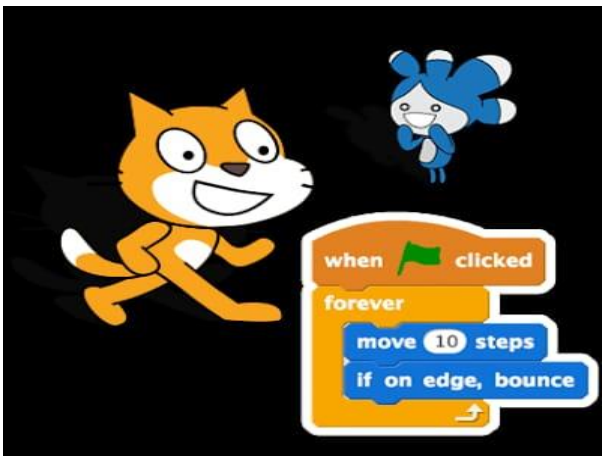
In addition to interviews with teachers, it is also important that researchers conduct interviews with three students. Interviews with students were held on November 7, 2017. Based on the results of interviews with students, the learning process was good enough and very conducive, and the use of the scratch application as a medium that facilitated student learning was also very good. Researchers use scratch media in mathematics subjects, where in mathematics subjects students sometimes find the difficulty to understand the lessons presented.

From the results of the field notes that the researchers noted during the study, the results stated that students were very repentent in the learning process, collaboration and also very good responsibilities. In addition, the use of scratch application as a means to facilitate learning process goes as the learning target.

The researchers concluded that the use of the scratch application in facilitating student learning is already very good and even successful when viewed from the perspective of private researchers. It's just that for making scratch animation students still can't, maybe students need time to understand how to operate the scratch optimally and also maximally.

**Pictures**


SCRATCH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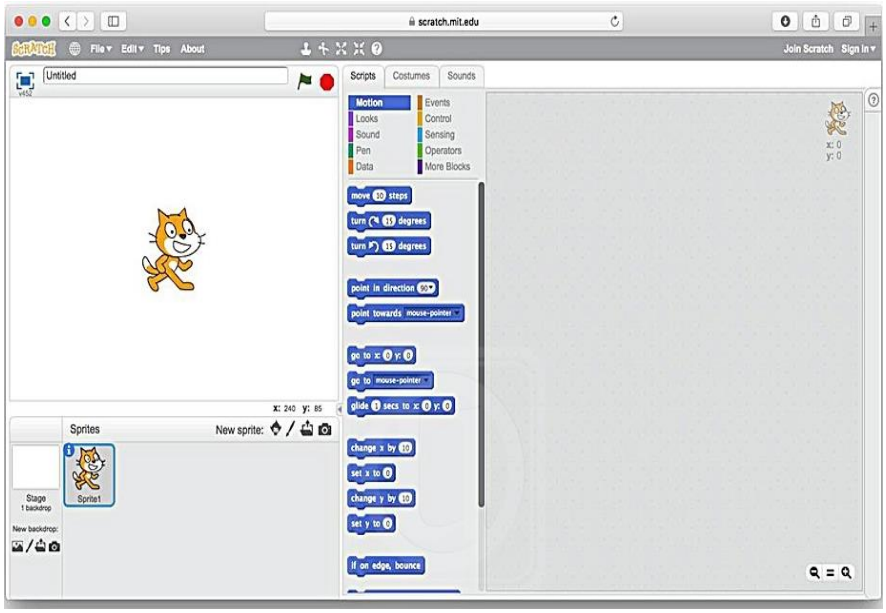
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Motion
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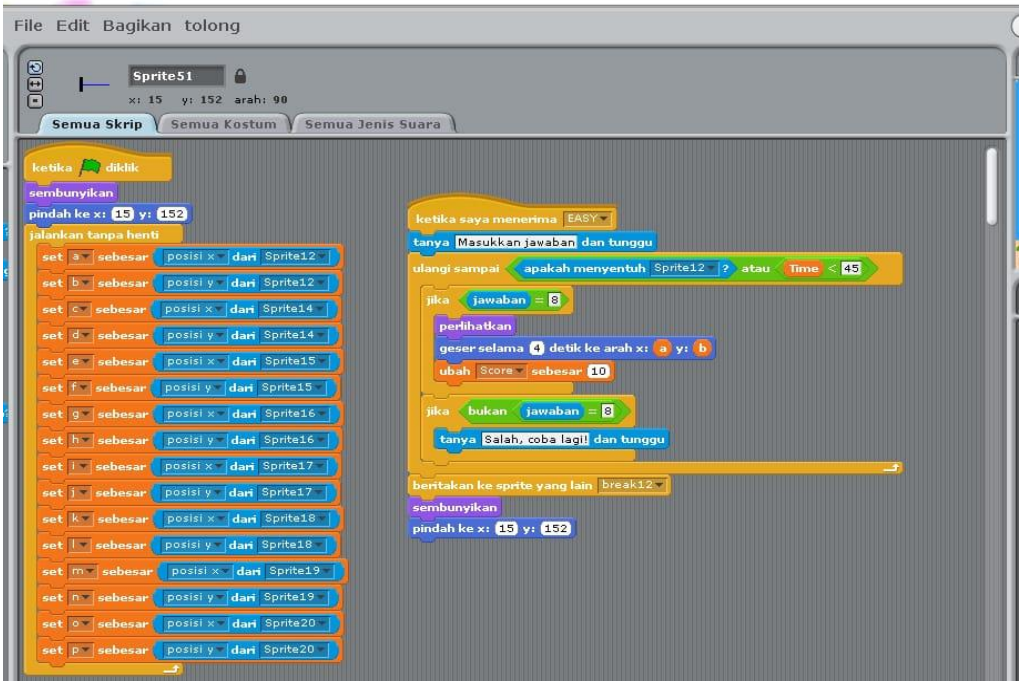
Pen
Data
Events
Control
Sensing
Operators
More Blocks
move 10 steps
turn 15 degrees
point in direction 90
point towards mouse-pointer
go to x: 0 y: 0
go to mouse-pointer
glide 1 secs to x: 0 y: 0
change x by 10
set x to 0
change y by 10
set y to 0
if on edge, bounce
Sprites
New sprite:
Stage
1 backdrop
Sprite1
New backdrop:




## 5. Conclusion

In accordance with the data obtained by the researchers, about how scratch as a learning media can facilitate students' learning process at Labschool FIP UMJ primary school, especially class 4.2. The implementation of the learning carried out great impact. From teaching materials, teacher's preparation and learning strategy in delivering materials make the students do not feel stiff when in class, but students still respect the teacher.

When viewed in terms of facilities and infrastructure, Labschool FIP UMJ primary school has been very good, a conducive environment and a good learning system. When researchers introduce scratch, students are very enthusiastic about responding to something new. Students respond positively to the scratch application. Especially if it relates to learning. By using scratch media, it has answered the question that schools are ready to face the challenges of the times, compete in the digital era and modernization. Scratch applcation gave meaningful help to the students' learning. It means scratch will be effective in making it easier for students to understand the subject.The students will not too confused even though it is classified as a new thing. Because scratch is very easy and simple when it is used and operated.

## References

Afrizal. 2015. *Metode Penelitian Kualitatif*. Jakarta: Rajawali.

Hansun, S. 2014. *Scratch Pemrograman Visual untuk Semuanya.* Tangerang (http://library.umn.ac.id/jurnal/public/uploads/papers/pdf/5f48ccb07ff031608a92f9387d4220af.pdf is accessed on May, 30, 2016).

Margono, S, 2010. *Metodologi Penelitian PendidikanI.* Jakarta: PT Rineka Cipta.

Martanti, A. P., Hardyanto, W., Sopyan A. 2013. Pengembangan Media Animasi Dua Dimensi Berbasis Java Scratch Materi Teori Kinetik Gas Untuk

Meningkatkan Pemahaman Konsep Siswa SMA. *Unnes Physics Education Journal*. 2 (2) : 19-25.

Resnick, M., Maloney J., Hernandez A. M., Rusk N., Eastmond E., Brennan K., Millner A., Rosenbaum E., Silver J., Silverman B., Kafai Y. 2009. *Scratch*: Programing for All. *Communication of The ACM*. 52 (11) : 60-67.

Sugiyono. 2015. *Metode Penelitian Pendidikan*. Bandung: Alfabeta.

Sukmadinata, Nana Syaodih, 2011. *Metode Penelitian Pendidikan*. Bandung: Remaja Rosdakarya.

Tekerek, M. dan Altan, T. 2014. *The effect of Scratch environment on student's achievement in teaching algorithm*. Journal on Educational Technology Vol 6, Issue 2, (2014) 132-138. (http://www.world-education-center.org/index.php/wjet/article/download/2791/pdf_288 is accessed on May 30, 2016)