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# The Effectiveness of Tynker and Scratch Application to Improve 4C Skills in Ecosystem Themes in Klumpit Public Elementary School

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**Abstract:** The conventional learning process is felt to be less fun and fairly monotonous. In addition, learning that is only centered on teachers and books will make students bored with learning in class. This study aims to analyze the differences in the effectiveness of Tynker and Scratch application media in improving the ecosystem theme 4C skills in fifth-grade elementary school students at Public Elementary School Klumpit. This type of research is quasi-experimental or quasi-experimental type research. The sample of the experimental group in this study amounted to 30 students, namely 15 students of class V Public Elementary School No. 3 Klumpit and 15 students of class V Public Elementary School No. 7 Klumpit. Meanwhile, in the control group sample, there were 17 fifth-grade students at Public Elementary School No. 5 Klumpit. Data collection techniques in this study used interviews, observation, documentation, and tests. The data analysis technique used is the validity test which is tested by the Universitas Muria Kudus graduate lecturer validator with the results that it is feasible to use. Then the reliability test shows the application media with a coefficient of 0.0929 and the matter with a coefficient of 0.907 which has a Cronbach alpha value greater than 0.600 which means reliable. Then in the test for the similarity of variance, the value of F-count = 0.64 is obtained. For F-table = 2.69, this shows F-count F-table (0.64 2.69). This means that the data on the learning outcomes of ecosystem themes for the two treatment groups came from a homogeneous population. Thus, it can be concluded that using Tynker application media is more effective.

**Keywords:** Tynker application media, scratch application media, 4C skills, ecosystem theme

## 1. Introduction

The conventional learning process is felt to be less fun and fairly monotonous. In addition, learning that is only centered on teachers and books will make students bored with learning in class (Murray & Pérez, 2015). Therefore, a learning innovation is needed, one of which is technology-based learning so that the appearance and learning style is more attractive and makes students avoid feeling bored and bored when participating in learning (Hameed, Badii, & Cullen, 2008).

The existence of learning media will make the learning process more interesting, for example in terms of appearance combined with several images or animations. Beauty, attractiveness, and the existence of interactivity in a learning media is a means so that students are not bored in following lessons and the greatest effect is that students are expected to be motivated and make it easier to receive subject matter (Mahnun, 2012).

The development of science and technology provides challenges for education graduates to create learning media that can improve the quality of better education (Kostoff & Schaller, 2001). The development of science and technology encourages teachers to produce computer-based learning media. With advances in technology, it is easier for teachers to make learning media for subjects that do not require high costs.

The more students who own and use mobile devices, the greater the opportunities for using technology devices in education. Learning media that utilizes mobile learning technology is an alternative for developing innovative learning media. At this time, information and technology affect school activities very massively (Vesudevan, 2021). New information and knowledge spread easily and are accessible to anyone who needs it. The role of the teacher who has been the only provider of knowledge has shifted away from him more or less. In the future, the role and presence of the teacher in the classroom will be more challenging and require a very high level of creativity. According to Dita et al. (2021) the use of learning media, which consists of text, images, animation, and sound, is very interesting and interactive to be used as learning media in schools.

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The use of Information and Communication Technology, especially smartphones in learning ecosystem themes at the elementary school level can present media in the form of Android applications. Currently, the use of smartphones as learning media is still rarely applied in schools, because there are not many innovations. Learning media based on Tynker and Scratch application media will help foster competence in children (Khotima et al., 2022).

In addition, the role of educational institutions plays an important role in preparing human resources, namely by increasing the competence of graduates who have skills according to the demands of the 21st century (learning and innovation skills) in addition to mastering science and technology following their fields (Zubaidah, 2018). Because the 21st-century trend is more focused on certain specializations, the goals of Indonesia's national education must be directed at equipping graduates with 21st-century skills.

The 21st-century skill that is meant is that everyone masters the 4Cs which are the means to achieve success in life in society in the 21st century. In the 2013 revision of the 2017 curriculum, skills development in the 21st century is required, namely 4C (Creativity, Critical Thinking, Communication, and Collaboration). 4C is a soft skill that in its daily implementation is much more useful than mastering a hard skill. Arnyana (2019) conducted research with research results that 4C competencies to face the 21st-century era can be trained in learning. In the research conducted by Triana, Anggraito, & Ridlo (2020) with the results of the study, namely in subjects with learning media, it can be concluded that there is effectiveness in student learning outcomes by using application learning media in subjects compared to using lecture learning.

Therefore, in carrying out education and teaching, in addition to teaching hard skills, you must also train soft skills. Based on this information, learning about soft skills, especially the 4C skills, is necessary for the 21st century. Besides that, what is no less important is changing the implementation of education and teaching so that in addition to mastering hard skills by the objectives of the subject, they also master soft skills in the form of 4C skills as a side effect. This is a challenge for teachers to innovate in their learning (Hidayatullah et al., 2021).

Based on the researchers' interest in learning ecosystem themes using Tynker and Scratch application media in improving 4C skills in the 21st century in high-class students, especially in fifth-grade elementary school, researchers feel it is important to carry out this research. For this reason, the researcher will conduct a study entitled "The Effectiveness of Tynker and Scratch Application Media to Improve 4C Skills in Ecosystem Themes in Klumpit State Elementary School Students".

## 2. Methodology

This study used a quasi-experimental or quasi-experimental research design. A quasi-experimental design is applied in this type of experimental research because the researcher cannot control the external variables. The quasi-experimental research design used was a nonequivalent control group design.

In this design, two groups are not selected randomly from the population but based on pre-formed class groups. The two selected groups were then given a pretest before being given different treatments. Experimental group 1 was treated using Tynker application media while experimental group 2 was treated with Scratch application media. The results of the two groups were then compared to determine the effectiveness of the application media in improving the 4C skills of the ecosystem theme.

## 3. Results and Discussion

### 3.1 Student Learning Outcomes Using the Tynker Application Ecosystem Theme for Class V Students at Public Elentary School 3 Klumpit

Student Learning Outcomes Using the Tynker Application Ecosystem Theme for Class V Students at Public Elementary School 3 Klumpit. The results of data analysis showed the average value of learning outcomes for the fifth-grade ecosystem theme at public primary school no. 3 Klumpit, which was taught using the Tynker application media, with an average score of 82.3 on the post-test score. The student's score after giving the post-test was in the high category with a percentage of 68%. Learning using the Tynker application media, can stimulate students to improve their 4C skills in ecosystem themes.

Observations were also made during learning both experimental group 1 and experimental group 2. This observation was carried out to determine whether learning was by the planned steps. In this study, the researcher was assisted by the classroom teacher. The class teacher acts as an observer. It can be concluded that after using Tynker application media in learning ecosystem themes, fifth-grade students at public primary school no. 3 Klumpit improved and were able to improve communication and collaboration skills. This can be proven at the time of treatment in learning, students interact with each other and are compact in the learning process. While in the control class, each child lacks communication and collaboration.

The 4C skills themselves include Critical Thinking Skills. Zhe (2016) defines critical thinking as logical and reasonable thinking that is focused on making decisions on the problems at hand. Baker, Rudd, & Pomeroy (2001) suggested that creative thinking involves all the basic functions of thinking, feeling, sensing, talent, and intuition. Creative thinking skills bring creativity. Creativity is based on intellectual development such as intelligence, talent, and

skills, which are supported by effective and psychomotor factors. Kim (2011) states that creativity is more on the right side of brain thinking which is more aimed at holistic, imaginative, and divergent thinking. While the left hemisphere of the brain is more on the ability to think convergently and logically.

Based on the description, creative thinking has a higher level than critical thinking, because it involves talent, imagination, intuition, and involves the ability to think as a whole. This is following the views of Jia, Li, & Cao (2019) who stated that thinking is divided into basic-level thinking and higher-order thinking. Higher-order thinking is divided into critical/logical thinking and creative thinking. According to him, creative thinking has a higher level than critical thinking, because it involves imagination, intuition, and talent. However, creative thinking skills can still be trained through learning activities or other activities in daily life.

This is because the learning process using the Tynker application media emphasizes active student participation, emphasizing critical, creative, communicative, and collaborative thinking skills. This learning model can increase the activity and participation of students to think critically, creatively, communicatively, and collaboratively by using the help of various learning resources such as relevant learning books or by using the internet. Reading various references can directly increase student knowledge so it can encourage critical thinking. However, most of the students are indifferent during the learning process. this is also possible because the application media has no sound so children are less than optimal in studying the material provided so and their understanding is lacking. This is what causes the student's average score to be lower than the experimental class 2.

## 3.2 Student Learning Outcomes Using Ecosystem Theme Scratch Application Media for Fifth Grade Students at Public Primary School 7 Klumpit.

The results of data analysis showed the average value of the ecosystem theme results for fifth-grade students at public primary school no. 7 Klumpit, who were taught using the Scratch application with an average score of 83 on the post-test score. The student's score after giving the post-test was in the high category with a percentage of 70%. The learning outcomes of the ecosystem theme of students who are taught using the Scratch application media learning model that gets scores in the high category are quite a lot. Learning using the Scratch application media, can stimulate more students in improving the 4C skills of the ecosystem theme.

Observations were also made during learning both experimental group 1 and experimental group 2. This observation was carried out to determine whether learning was by the planned steps. In this study, the researcher was assisted by the classroom teacher. The class teacher acts as an observer. It can be concluded that after using Scratchr application media in learning ecosystem themes, fifth-grade students at public primary school no. 7 Klumpit improved and were able to improve communication and collaboration skills. This can be proven at the time of treatment in learning, students interact with each other and are compact in the learning process. While in the control class, each child lacks communication and collaboration.

Learning the ecosystem theme of fifth-grade students at public primary school no. 7 Klumpit, who was taught using the Scratch application as a media, was chosen in this study because this learning model can increase student activity and create a pleasant learning atmosphere. Students are taught special skills to work well in groups, such as being active listeners, giving good explanations to friends, discussing, and so on. Learning using the Scratch application media can improve children's skills, especially in critical thinking skills, creativity, communication, and collaboration with group friends.

The success of this learning model is also supported by the activities of students who play an active role during the learning process, provide opinions, and are active in asking questions so that they have a broader understanding of the material being taught. Slavin (2015) states that cooperative learning has many forms (types), but all of them involve students working in small groups or teams who help each other in learning the subject matter. In cooperative learning strategies, moral values education can be found, namely: there is respect for groups, individual and group responsibility, opportunities to succeed together, learning is fun, working in pairs, and working in groups.

## 3.3 Differences in Student Learning Outcomes with Ecosystem Themes for Class V Students at Public Primary School 3 Klumpit Using Scratch Application Media and Public Primary School 7 Klumpit Using Tynker Application Media

It has been stated previously that the t-test was used for hypothesis testing with a significance level of alpha ($\alpha$) = 0.05. The conditions that must be met for hypothesis testing are that the data obtained are normally distributed and have a homogeneous variance. Therefore, before testing the hypothesis, the normality test and homogeneity test were carried out first. The normalization test aims to see whether the data on the learning outcomes of ecosystem themes do not deviate from the normal distribution or not, while the homogeneity test aims to see whether the two groups come from a homogeneous population or not.

Based on the results of the analysis of the One-Sample Kolmogorov-Smirnov Test data for the experimental group 1 (Class V at public primary school no. 3 Klumpit) which was taught using the Tynker application media, the p-value = 0.149 for = 0.05, this shows p >f. This means that the score data for learning outcomes on ecosystem themes for experimental group 1 (Class V at public primary school no. 3 Klumpit) taught using Tynker application media is

normally distributed. Meanwhile, the results of data analysis for experimental group 2 (Class V at public primary school no. 7 Klumpit) who were taught using the Scratch learning media, obtained a p-value of 0.758. For = 0.05, it shows p >f. This means that the data on the value of learning outcomes on ecosystem themes for group 2 (Class V at public primary school no. 7 Klumpit) taught using Scratch learning media is normally distributed, so the data for the two groups are normally distributed.

Based on the test for the similarity of variance, the value of F-count = 0.64 For Ftable = 2.69, this shows F-count F-table (0.64 2.69). This means that the data on the learning outcomes of ecosystem themes for the two treatment groups came from a homogeneous population. Next is the hypothesis test of the difference between the post-test scores of experimental class 1 and experiment 2. The results of the t-test analysis show that the t-value is 0.115 and the significance value is 0.036. The significance value is 0.05, it can be stated that Ha is accepted and Ho is rejected, which means that there is a significant difference in the post-test results of experimental group 1 and experimental group 2. Thus, it can be concluded that there is a significant difference in the post-test results. test the experimental group 1 which learns the ecosystem theme using the Tynker application media and the experimental group 2 which learns the ecosystem theme using the Scratch application media.

This means that the use of Tynker and Scratch learning media can improve student learning outcomes even though there is a slight difference in the average score of the post-test results for the two classes. So, it can be concluded that the two media learning can improve student learning outcomes, especially on the ecosystem theme. The research conducted has similarities and differences with Febriani et al. research (2022) and Lestari et al. research (2020). The equation in question is the choice of application media as a medium in the learning process. The difference is in the focus and research results obtained. Santoso et al. research (2019) showed that there was an increase in skills in the pre-test to 80.63% and an increase in the post-test to 83.54%. Meanwhile, Lestari et al. research (2020) shows that there is an increase in learning outcomes in the pre-test from 50% and significant increases in the post-test to 78.5%.

**Table 1: Mean score, modus dan median post-test**

| No. | Class | Total Student | Average/ Mean | Modus | Median |
|---|---|---|---|---|---|
| 1 | Public Elementary School No. 3 Klumpit (Experiment used *Tynker)* | 15 | 82.3 | 80 | 80 |
| 2 | Public Elementary School No. 7 Klumpit (Experiment used *Scratch*) | 15 | 83 | 80 and 90 | 85 |
| 3 | Public Elementary School No. 5 Klumpit (Control) | 17 | 79.4 | 80 | 80 |

The results of the calculation of the mean (mean) of student learning outcomes between the two groups indicate that the learning outcomes of students' ecosystem themes who are taught using the Tynker application media (experiment 1) are lower than the learning outcomes of students' ecosystem themes who are taught using the Scratch learning model (experiment 2) namely the average value of student learning outcomes (posttest) experimental class 1 is 82.3 and the average value of student learning outcomes (posttest) experimental class 2 is 83. Based on the results of this study it can be concluded that the application of the Tynker and Scratch can improve student learning outcomes on the theme of ecosystems in grade V elementary school.

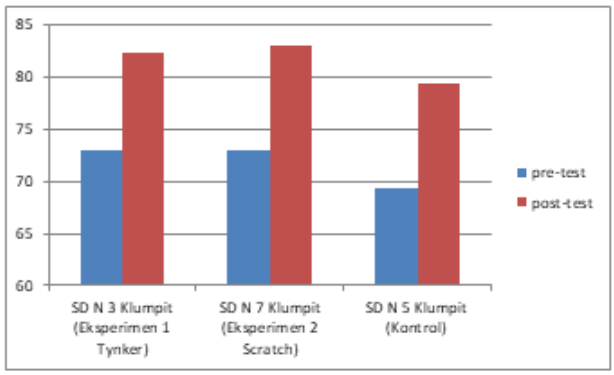


**Fig. 1. Comparison of pre-test and post-test scores**

According to Cahyo & Habibi (2020), the use of learning media supports the occurrence of an active and fun class for students. By using learning media that are by the material, the teacher is facilitated in the process of delivering

information as well as making it easier for students to capture information. Therefore, the use of appropriate learning media can achieve the desired learning objectives.

At the interview stage, which was conducted by the researcher simultaneously with the fifth-grade students of public primary school no. 3 Klumpit, stated that learning using the Tynker application media was very fun. Likewise, with the fifth-grade students of public primary school no. 7 Klumpit. They stated that learning by using the Scratch application media was very fun. Thus, it can be concluded that using Tynker and Scratch application media makes it easier and able to effectively improve 4C skills which include critical thinking skills, creativity skills, communication skills, and collaboration skills on ecosystem themes.

## 4. Conclusion

The results of data analysis showed the average value of the learning outcomes of the fifth-grade ecosystem theme students who were taught using the Tynker application media with an average score of 82.3 on the post-test score. The student's score after giving the post-test was in the high category with a percentage of 68%. Learning using the Tynker application media, can stimulate students to improve their 4C skills in ecosystem themes.

The results of data analysis showed the average value of the ecosystem theme results for class V students who were taught using the Scratch application media with an average score of 83 on the post-test score. The student's score after giving the post-test was in the high category with a percentage of 70%. The learning outcomes of the ecosystem theme of students who are taught using the Scratch application media learning model that gets scores in the high category are quite a lot. Learning using the Scratch application media, can stimulate more students in improving the 4C skills of the ecosystem theme.

The results of the t-test analysis show that the t value is 0.115 and the significance value is 0.036. The significance value is 0.05, it can be stated that Ha is accepted, and Ho is rejected, which means that there is a significant difference in the post-test results of experimental group 1 and experimental group 2. This indicates that there is a significant difference in the results of the post-test group. Experiment 1 is learning ecosystem themes using the Tynker application media and experimental group 2 is learning ecosystem themes using Scratch application media. The results of the calculation of the mean (mean) of student learning outcomes between the two groups, namely experimental group 1 (Class V at public primary school no. 3 Klumpit), and experimental group 2 (Class V at public primary school no. 7 Klumpit) showed that the learning outcomes of the ecosystem theme of students being taught using the Tynker application media (experiment 1) is lower than the learning outcomes of the ecosystem theme of students who are taught using the Scratch learning model (experiment 2), namely the average value of student learning outcomes (posttest) in experimental class 1 is 82.3 (eighty-two points three) and the average value of student learning outcomes (posttest) experimental class 2 is 83 (eighty-three). Thus, it can be concluded that using Tynker application media is more effective.

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