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MEDIA EFFECTIVENESS OF ANDROID-BASED E-GEA APPLICATION TO IMPROVE CRITICAL THINKING SKILLS

Clara Adhi Pratiwi Sukmana Dewi*, Chatarina Muryani, Sarwono, and Rita Noviani
Magister Geography Education, Teacher Training and Education, Universitas Sebelas Maret, Indonesia

*E-mail: claraadhi2@student.uns.ac.id

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ABSTRACT

This study aims to test the effectiveness of Android-based E-GeA learning media in improving the critical thinking skills of grade X students of SMA Negeri Kebakkramat, Karanganyar. The E-GeA application for Electronic Geography Adventure is designed to support geography learning through interactive features, such as learning videos, materials, animations, and pre-test and posttest-based exams. The study used an experimental and purposive sampling technique on 36 students in grades X-5. The data were analyzed using normality, and t-test tests. The results showed that the t-test results showed a significant difference between the pre-test 30 and post-test 86 scores, with 94% of students achieving KKM scores. This study proves that E-GeA learning media improves students' critical thinking skills. These findings provide recommendations for integrating technology in geography learning to support improving the quality of education and skills in the 21st century.

Keywords: *Critical Thinking; Application; E-Gea; Geography Learning*

INTRODUCTION

In the 21st century, the educational landscape rapidly evolves due to technological advancements and changing workforce demands. As a result, students need to develop critical thinking skills to navigate this complex and dynamic world effectively (Yeh et al., 2024). These skills are important for academic success and students' personal growth. Educators play a crucial role in fostering critical thinking skills by adopting innovative teaching approaches, encouraging students to think critically, solve problems, collaborate, and reflect on their learning (Abd Halim et al., 2024). Additionally, teaching critical thinking skills allows students to analyze information, evaluate arguments, and make well-informed decisions.

Education plays an important role in the development of a country. Geography in the education system is critical because it gives students a deeper understanding of the world around them. Geography helps students develop spatial awareness,

critical thinking skills, and a global perspective. Additionally, studying geography allows students to learn about different cultures, societies, and environments, thus fostering an appreciation for diversity. Geography also equips students with essential skills such as reading maps, analyzing data, and problem-solving (Riuttanen et al., 2021). By studying geography, students can gain valuable knowledge about their own country's landscapes, climate, and natural resources. This knowledge is essential for sustainable development, environmental conservation, and disaster preparedness. In addition, geography education helps students understand the interconnectedness of various regions and the impact of human activities on the environment (Henninger & Christmann, 2023).

Technology products can be used in education, including learning media. Media, as a tool used by teachers in learning, aims to present material interestingly and contain all the content of the material that wants to be conveyed. Media as a tool in delivering material is expected to make it easier for students to understand learning materials (Hernández et al., 2024). The proper media selection according to needs is expected to improve students' critical thinking skills. Geography subjects cover much material that all students must understand. Teachers are required to convey all material so students can understand it well. In its implementation, there are several obstacles in the learning process, namely, the time for geography learning in the classroom is not balanced with the scope of the material that must be delivered, the limitation of practicum time, and the lack of technology-based media (Nguyen et al., 2024; Raju & Sistla, 2022). The material that is too broad and has limited time makes geography subjects seem challenging for students to understand. The problem of geography learning requires appropriate media innovation (Faisal Arif Setiawan et al., 2024; Muin et al., 2024). The Android application-based learning Media can be developed by utilizing technology and communication. Geography learning requires an accurate visualization of a natural phenomenon on Earth. The use of visual media for field-based learning in geography education can be a valuable tool, especially when schools face limitations in holding practicums outside the classroom (Nemtinov et al., 2023; Sebastián-López & González, 2020).

The learning process applied by geography teachers at Kebakkramat State High School, Karanganyar Regency, uses a conventional-based learning method with a problem-solving model. The conventional method is also known as the traditional learning method or the lecture method. Teachers are more likely to use conventional methods because they are used to this method, which is commonly used at every level of education. So, it is necessary to apply innovative learning media to improve critical thinking skills.

The learning media applied is the Android-based E-GeA learning application media. E-GeA stands for Electronic Geography Adventure, a mobile learning application allowing users to view geospherical phenomena videos. To assess the success rate of E-GeA learning media, this study was conducted to analyze the effectiveness of android-based E-GeA application media in improving critical thinking skills.

MATERIALS AND METHODS

This experimental study aims to assess the effectiveness of android-based E-GeA application media in improving critical thinking skills. This research was conducted at SMA 1 Kebakkramat Karanganyar Regency. The population in this study is students of class X of Kebakkramat State High School. The sampling technique used in this study is the Purposive Sampling Technique. This sampling approach was chosen because the number of students with low and high abilities was less than that of students with medium abilities; namely, all students from class X-5 were test subjects.

Testing the effectiveness of a model or product is a stage of testing the effectiveness of the product produced in the study compared to ordinary learning used in schools (Rustamana et al., 2024; Sukmadinata, 2012). The research instrument used in this study is a critical thinking test for the beginning of learning called the pre-test and the post-test at the end of learning. There are five question items covering three cognitive domains: Analyzing (C4), Synthesis (C5), and Creating (C6). Before the questions are implemented, validity and reliability tests are carried out. Experts and practitioners carry out validity and reliability tests. The E-GeA application is used in the learning process after a pre-test is conducted, so that after the application is implemented we can

measure the level of effectiveness of the application.

The validity test results showed that five pre-test questions had a value of more than 0.72, so they were declared valid and suitable to be used as a critical thinking test instrument for students. The post-test instrument was tested for validity using the Aiken formula, with a valid result if the validity index was more than 0.72. Validation data was obtained from the Likert scale by validators. Five post-test questions were also declared valid based on the results. A question is considered reliable in the reliability test if it has a Cronbach Alpha index of more than 0.60. The pre-test question is 0.610, while the post-test question is 0.622; both meet the reliable criteria.

After the questions are considered reliable and valid, the pre-test and post-test questions are tested for class X-5 SMA 1 Kebakkramat. The pre-test was tested while learning was still using conventional media, and the post-test was tested after the application of Android-based E-GeA learning media. The pre-test and post-test results were tested for effectiveness in obtaining results on whether or not the E-GeA learning media was effective in improving students' critical thinking skills.

The results of the pre-test and post-test were carried out normality tests. The normality test is a prerequisite to determine whether the data is normally distributed. This study will analyze the liliesfors test. The liliefors test is used because the sample size is smaller than 100. H0 states that the sample is from a normally distributed population, whereas H1 states that the sample comes from a non-normally distributed population. The liliefors test in this study uses a significance level of 5% with the criterion that if Lca l> Ltabel, then H0 is rejected (Ghozali, 2016).

The test result data in measuring the level of critical thinking of students can be seen from the results obtained in doing the test questions. The success criteria in this study are based on the difference in the average score of preetest and posttest critical thinking skills. If the posttest score shows a significant increase in the score of the preetest score, then the E-GeA application used is effective in improving students' critical thinking skills in learning. The results of the Paired Sample T-Test used the following hypotheses:

H0 : μ1 = μ2 with H0 : there is no difference in the average *preetest* score and *posttest score.*

Ha: μ1 > μ2 with Ha: there is a difference in the average *preetest* score and *posttest score.*

If the P Value value is less than 0.05, the hypothesis obtained is significant, which means that there is an average difference between *the preetest* score and *the posttest* score.

RESULTS AND DISCUSSION

Android-based E-GeA learning media is a learning media that previous researchers have developed. This learning medium allows students to access material outside of class hours, both individually and in groups. This Media encompasses elements such as text, images, videos, and animations designed to enhance the user experience. This application includes several learning menus, including the Home (containing learning objectives, achievements, Pancasila student profiles, and teaching materials), learning materials, learning videos, student worksheets, and exam menus. The exam menu contains pre-test and post-test questions used to assess the effectiveness of using the E-GeA Application.

Overall, the E-GeA application is designed not only to meet the needs of digital-based learning, but also to support the development of students' critical thinking skills. The E-GeA application uses the FRISCO (Focus, Reason, Inference, Situation, Clarity, Outcome) approach, which helps students analyze geosphere phenomena in depth, similar to a problem-based learning approach. The multimedia approach used provides a more meaningful learning experience, in accordance with the theory of constructivism that places students as active subjects in learning. With a combination of visual elements, interactivity, and real-world case studies, the app has become a relevant and adaptive learning medium for modern educational contexts.

The advantage of the E-GeA app is its ability to provide a project-based learning experience. For example, the app offers interactive features such as practice questions, explainer videos, and real case studies on geosphere phenomena, such as land change and ecosystem issues. These features help students relate research concepts to real-life situations, thus encouraging the development of analytical and critical

thinking skills. Through the integration of visual elements and automated evaluations, students can be more motivated to learn independently outside of the classroom. However, there are several challenges in the implementation of this application, such as time constraints for students in filling out evaluations and initial adaptation to the use of digital media in learning. This problem can be overcome by providing initial assistance for students and integrating training on the use of applications in learning routines. This step will help students make more optimal use of the app's features. Menu android-based E-GeA learning app shown in **Figure 1**.

The results of the pre-test and post-test students were tested statistically as follows:

1. Normality Test

The liliefors normality test was carried out with the Microsoft Excel 2023 program, with the data used were the students' pre-test and post-test results. The liliefors normality test has the principle of concluding if L Counts < from L Table, then H_0 it is accepted, which means that the data is normally distributed. If L calculates > from the L Table, it is H_0 rejected, meaning the data is abnormally distributed. The Pre-test results' normality data showed that the P value of the pre-test data calculation was 0.08896 < 0.14540 L value of the Table. From these results, it can be concluded that the pre-test data of class X-5 is normally distributed. Meanwhile, the normality data of the score of the post-test results shows that the calculation of the L value of the post-test data calculation is 0.12391 < 0.14540 of the L value of the Table. So, it can be concluded that the post-test data of class X-5 is distributed normally.

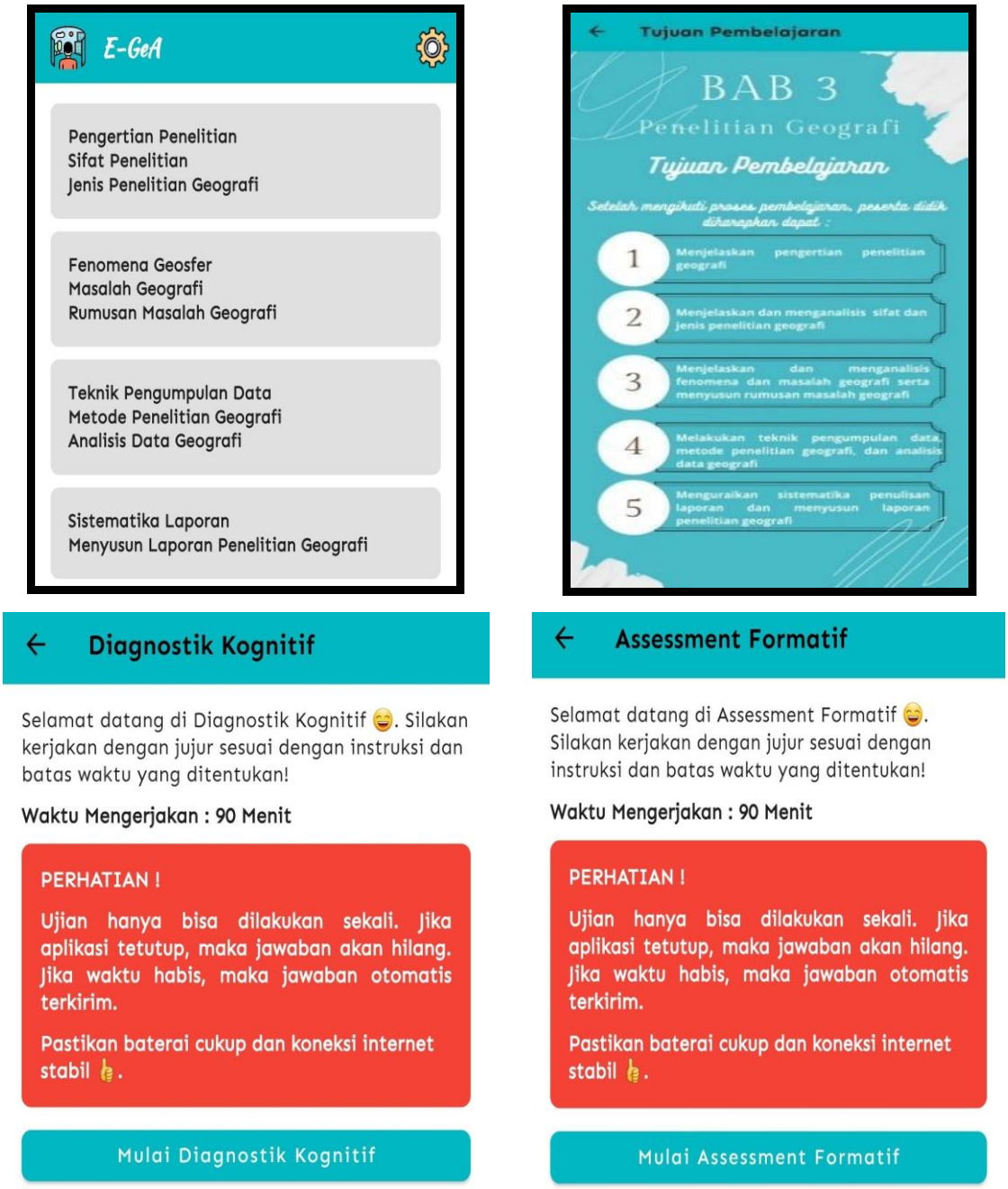

Figure 1. Menu Android-based E-GeA learning app

2. The Effectiveness of the E-GeA Application in Improving Critical Thinking Skills

To assess the effectiveness of the E-GeA application, namely by testing the pre-test / cognitive diagnostic score and the post-test score / formative assessment that has been carried out the Normality test, if it has been said to be a Normal distribution, the next test can be carried out.

The Effectiveness Test was used to analyze the data using the Paired Sample T-Test conducted with the Microsoft Excel 2023 program. The paired T test was carried out to find out whether the research hypothesis in this case had a difference in results that could be proven or not. The results were obtained as in the Paired Sample T-Test, the researcher used the hypothesis:

H0 : μ1 = μ2 with H0 : no difference in the average preetest score and posttest score

Ha : μ1 > μ2 with Ha : there is a difference in the average preetest score and posttest score

The hypothesis results were obtained significantly, which means that there was an average difference between the preetest score of 30 and the posttest score of 86. The results of the calculation of the T-Test are shown in **Table 1.**

Table 1. T-test Results

	Variable 1	**Variable 2**
Mean	30	86
Variance	3,185890653	4,03694885
Observations	36	36
Pooled Variance	1,7890634	
Hypothesized Mean Difference	0	
df	70	
t Stat	-26,1979	
P(T<=t) one-tail	1,784906343	
t Critical one-tail	2,00921598	

The results of the pre-test showed that none of the 36 students achieved the KKM score. However, after using E-GeA learning media, 94% of 36 students achieved KKM scores (34 students), while 6% still did not (2 students). As many as 6% of students have not reached the minimum completeness criteria because the students do not participate optimally in learning activities, so they cannot understand the material delivered by the teacher using E-GeA media. The average score of students before using E-GeA learning media was 30, which increased to 86 after E-GeA media was applied during the learning process. It can be concluded that the use of Android-based E-GeA learning media

has proven to be effective in improving student scores. This study shows significant effectiveness in improving student learning outcomes through android-based media. E-GeA excels because it provides case study content, thus better supporting students' analytical abilities.

Android application-based learning media such as E-GeA is considered adequate because this application has several advantages that cannot be found in conventional media. The advantages of Android-based learning application media often include interactive modules, videos, images, text, and animation elements that suit various learning styles. These features make the learning process more engaging and facilitate personalized education by allowing students to learn at their own pace (Eliza et al., 2024; Hakiki et al., 2024). Additionally, the mobile nature of the app allows for "anytime and anywhere" learning, which is particularly beneficial for students with varied schedules or those who need additional support outside of the traditional classroom environment (Hakiki et al., 2024; Mufidah et al., 2020).

The success of using Android-based applications at Kebakkramat Karanganyar High School showed an increase in the pre-test to post-test scores. This aligns with the research of Nuri et al. (2023), who developed an Android-based mobile learning module to improve critical thinking skills in junior high school students. The module shows a significant improvement in critical thinking skills after implementation. This success is also shown by the research of Hamdani et al. (2022), who created Android-based interactive multimedia to improve critical thinking in the context of education; the results showed that the average improvement score was classified as moderate improvement (0.52), and it can be concluded that android-based interactive multimedia is quite effective in improving students' critical thinking skills in learning materials.

CONCLUSIONS

The E-GeA learning media based on Android has proven to be effective in improving students' learning outcomes and critical thinking skills, with students' average scores increasing from 30 (pre-test) to 86 (post-test). This application utilizes interactive features such as video and animation, making it easier for

students to learn independently and flexibly anytime and anywhere. As many as 94% of students achieved the KKM score after using this application, confirming the great potential of Android-based learning technology. In the future, schools can integrate this application into routine learning programs. At the same time, further research is recommended to explore its effects on non-cognitive aspects, such as student motivation and engagement.

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