The Effectiveness of Differentiated Learning Based on *Smart Apps Creator* (SAC) on Creative Thinking Skills in Class VI IPAS Subjects in Wonogiri Sub-District Public Elementary School

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Abstract

Creative thinking is a skill that facilitates students in the learning process. This study aims to determine the effectiveness of differentiated learning based on Smart Apps Creator (SAC) on creative thinking skills in grade VI IPAS subjects. This type of research is quantitative research. The research sample was 69 grade VI students in Wonogiri sub-district public elementary schools. Data analysis was carried out using simple linear regression analysis techniques. The results showed that the correlation value (R) = 0.508 means that there is a positive linear relationship between variables; the coefficient of determination R Square = 0.849 means that differentiated learning based on Smart Apps Creator (SAC) provides 84.9% influence on the effectiveness of creative thinking skills. The significant value of 0.000 < 0.05 and the t value of 2.504 > t table 1.668, meaning that the alternative hypothesis is accepted. The conclusion of the research is that differentiated learning based on Smart Apps Creator (SAC) is effective on creative thinking skills in IPAS subjects of grade VI elementary schools in Wonogiri sub-district.

Keywords: Differentiated Learning, SAC, creative thinking skills.

Abstrak

Berpikir kreatif merupakan keterampilan yang memudahkan peserta didik dalam proses pembelajaran. Penelitian ini bertujuan untuk mengetahui efektivitas pembelajaran berdiferensiasi berbasis *Smart Apps Creator* (SAC) terhadap keterampilan berpikir kreatif pada mata pelajaran IPAS kelas VI. Jenis penelitian ini adalah penelitian kuantitatif. Sampel penelitian adalah 69 peserta didik kelas VI di SD Negeri kecamatan Wonogiri. Analisis data dilakukan dengan menggunakan teknik analisis regresi linier sederhana. Hasil penelitian menunjukkan nilai korelasi (R) = 0.508 artinya ada hubungan linear positif antar variabel; *koefisien determinasi* R *Square* = 0,849 artinya pembelajaran berdiferensiasi berbasis Smart Apps Creator (SAC) memberikan pengaruh 84,9% terhadap efektivitas keterampilan berpikir kreatif. Nilai signifikan sebesar 0.000 < 0,05 dan nilai t hitung 2,504 > t tabel 1.668, artinya menerima hipotesis alternatif. Kesimpulan penelitian adalah pembelajaran berdiferensiasi berbasis Smart Apps Creator (SAC) efektif terhadap keterampilan berpikir kreatif pada mata pelajaran IPAS kelas VI SD di kecamatan Wonogiri.

Kata kunci: Pembelajaran Diferensiasi, SAC, keterampilan berpikir kreatif.

INTRODUCTION

Learning in the Merdeka curriculum, teachers are focused on paying attention to the potential of individual students. Learners' learning styles need to be considered by the teacher before learning is carried out. Learning that takes into account students' learning styles is often called differentiated learning. The differentiated learning model is a process or philosophy for effective teaching by providing diverse ways of understanding new information for all students in their diverse classroom communities, including ways to: get content; process, build, or reason ideas; and develop learning products and assessment measures so that all students in a classroom with diverse ability backgrounds can learn effectively (Faiz, Pratama, and Kurniawaty, 2022).

Creative thinking skills are one of the skills needed by students in this era of globalization. According to Soemarjadi (in Asrori, 2020) skills are behaviors that are acquired through learning stages. Meanwhile, according to Nasihudin and Hariyadin (2021) skills are the ability to carry out a particular task, both physically and mentally. This skill involves the use of thoughts, ideas, and creativity. According to Zubaidah (2016) skills are abilities that are implemented in the implementation of work or activities. These skills are formed from experience and the learning process. Meanwhile, creative thinking is a person's ability to generate new, unique, and relevant ideas to solve problems or create something innovative (Agustina and Noor, 2016). Another definition, creative thinking is the ability to think to find, generate, develop original, aesthetic, constructive ideas or results related to views, concepts, which emphasize aspects of intuitive and rational thinking (Kamilla, 2018). Meanwhile, according to Situmorang *et al.* (2023), creative thinking is an individual activity to obtain a series of new and original ideas from concepts, experiences, and knowledge that have been obtained.

According to Rizqi *et al.* (2021) creative thinking skills are an individual's skill to solve a problem and solution simply according to the results of his own way of thinking so as to form something new and unique. Meanwhile, according to Marliani, (in Ulandari, *et al.* (2019)), creative thinking skills are a power to manifest or grow new things, in other words, something that is not the same that is unique through ideas that are manifested from the majority of people. In addition, creative thinking skills can lead to new knowledge, new methods, and new ways of understanding things. This ability allows learners to generate new, innovative, and effective ideas in solving problems. Therefore, creative thinking skills are needed by learners in the learning process. However, in fostering these skills there are challenges in the form of differences in characteristics possessed by each learner. These differences often make it difficult for teachers in the teaching and learning process, so that the potential of each learner is not maximally developed. There is a need for a learning method that focuses on differences in learning responses both material, treatment, and tasks for each learner characteristic or often called the *Smart Apps Creator* (SAC) based differentiation learning method.

Differentiated learning is an effective teaching process that provides a variety of ways to understand new information for all students in a diverse classroom community, including ways to process, construct, or reason ideas, and develop learning products and assessment measures so that all students in a classroom who have diverse ability backgrounds can learn effectively (Mahfuz, 2023). Differentiated learning is a learning concept that accommodates every difference in student characteristics in the learning process according to the potential found in the school environment (Mulyawati *et al.*, 2022; and Siagian *et al.*, 2022). According to Avcu and Yaman (2022); and Faiz *et al.* (2022), differentiated learning is generally learning activities that provide access to independence for students in learning according to their abilities, interests, talents, learning styles, and skills. Therefore, the differentiated learning method can be synthesized as a learning method that accommodates each difference in learner characteristics by providing various ways such as processing, building, or reasoning ideas, and developing learning products and learner assessment measures according to

the abilities, interests, talents, learning styles, and skills in each learner. According to Tomlinson and Moon (in Sarnoto, 2024), there are five basic principles that help teachers in implementing differentiated learning, namely learning environment, quality curriculum, continuous assessment, responsive teaching, and leadership and classroom routines. According to Mahfudz (2023), differentiated learning is divided into three strategies in the implementation process, namely: 1) Content differentiation, providing different materials, according to the level of learning readiness of each student, 2) Process differentiation, learning that provides variations to students in understanding material, discovering theories or other processes, 3) Product differentiation, giving different assignments to students. These differences are inseparable from students' learning readiness, interests and learning profiles.

Smart App Creator (SAC) is a desktop application, which allows the creation of Android and iOS mobile applications without the need for programming knowledge. This application can generate HTML and EXE files, and can be saved in Ahl or Apk file formats that can be run on laptops and Android phones (Almukarramah, *et al.*, 2023). The advantages include ease of use by students, can be downloaded and run offline without requiring a stable internet connection. Khoirudin, *et al.*(2021) explained that the display presented by SAC is a combination of *e-book* and *power point*. The combination of *e-book* and *power point* provides an opportunity for the creation of electronic modules. Thus, a simple display makes it easy for students to use and learn the material in the media. In its development, media using SAC *software* is used to become learning media or mobile applications for certain lessons, such as electronic modules (E-modules) that are interactive based on androit and iOS without *coding*. Zainil, *et al.*(2019) explained that the advantages of SAC, namely: 1) Easy to use the SAC application, 2) Able to create learning media based on android and iOS without coding, 3) Students will not get bored easily because of interactive learning media, 4) Students can better understand and remember the material presented because the learning media is interactive and interesting, 5) Can be freely created according to needs, 6) The application file size is not too large (light), 7) This application does not take up a lot of RAM, 8) The features available are sufficient to create a learning media, 9) Teachers are facilitated in making animations, 10) The application display is simple and comfortable to use, 11) Can be saved with results for andoid, iOS, Exe, HTML devices.

SAC-based learning media that will be compiled need to pay attention to the characteristics as media. Limbong *et al.*(2022) a learning media can be said to be good and interesting if there are characteristics, namely: *Self Instruction*, *Self Contained, Stand Alone, Adaptive, User Friendly*. Therefore, the differentiated learning model based on *Smart App Creator* (SAC) is one of the methods it needs in overcoming the different characteristics of each student to foster creative thinking patterns. Based on the above background, the researcher is interested in conducting research with the title "The Effectiveness of Differentiated Learning Based on *Smart Apps Creator* (SAC) on Creative Thinking Skills in IPAS Class VI Subjects in Wonogiri District State Elementary Schools".

Creative thinking skills in science subjects are the ability of students to generate new ideas, solve problems in unique ways, and create innovations in understanding science concepts. In the context of education, creative thinking is one of the important skills that students must master to face the challenges of an increasingly complex era. Studies show that this skill not only affects learning outcomes, but is also closely related to problem-solving and decision-making abilities in everyday life (Robinson, 2011). According to Torrance (1974), creative thinking can be measured through fluency, flexibility, originality, and elaboration in processing information. Effective education facilitates the development of this creativity through inspiring and challenging learning approaches. Science learning, with its explorative and investigative nature, is an ideal platform to foster these skills. Therefore, it is important for educators to adopt teaching strategies that encourage students to experiment and think outside the box.

Basically, differentiated learning applied in the current curriculum aims to accommodate various creative thinking abilities of students in one classroom. Mulyawati *et al.* (2022) and Siagian *et al.* (2022) emphasized that differentiated learning provides opportunities for students to interact with learning materials according to their respective abilities and interests. With differentiated learning, students can more freely develop creative thinking skills in science subjects through a learning process that is tailored to their learning styles and talents. This emphasis on differentiation allows students to experience more personalized and relevant learning, which in turn can trigger an increase in creative skills. Therefore, educational strategies that focus on differentiation not only improve teaching effectiveness, but also contribute significantly to the development of students' creative thinking skills.

Creative thinking skills in science subjects can be defined as the ability of students to generate new ideas, see various possible solutions, and think out-of-the-box in understanding concepts and solving problems in natural science. This ability plays an important role in forming a deep understanding of natural phenomena, so that students not only memorize concepts but also integrate creativity in learning. According to Tomlinson and Moon (in Sarnoto, 2024), the implementation of differentiated learning supports the development of these skills through adaptive learning environments and quality curriculum. Furthermore, the components of continuous assessment and responsive teaching have been shown to improve students' analytical and synthesizing abilities, two elements that are crucial in creative thinking. With this understanding, it can be concluded that creative thinking skills in science emphasize the ability to solve problems with new and innovative approaches, which is a key goal in STEM (Science, Technology, Engineering, and Mathematics) based education.

In the context of learning with Smart Apps Creator (SAC), creative thinking skills can be further empowered through the use of interactive technology. Smart App Creator, as described by Almukarramah *et al.* (2023), makes it easy to create apps without having in-depth programming knowledge. This allows students to focus more on the creative aspects of solving problems and presenting their learning outcomes. In addition, according to Khoirudin *et al.* (2021), the display presented by SAC, which is a combination of e-book and power point, makes it easier for students to learn the material in a more interesting and innovative way. Utilizing this technology, students are encouraged to explore and apply science knowledge in various new forms, thus improving their creative thinking skills. Therefore, by combining these interactive elements, the learning process becomes more dynamic and effective in achieving the goal of developing creative thinking skills in science subjects.

Creative thinking skills in science subjects are the ability to create innovative solutions to complex problems, build divergent thinking, and apply scientific knowledge in new and different ways. According to Zainil *et al.* (2019), the use of interactive learning applications, such as Smart Apps Creator (SAC), can help improve these skills by making learning more interesting and less boring. In an educational context, interactive media allows students to understand and remember material more effectively, which directly contributes to the development of creative thinking skills. The features of the SAC, such as the ease of animation creation and the convenient interface, also facilitate a more dynamic and creative learning process. In line with that, Limbong *et al.* (2022) emphasized that good learning media should have characteristics such as adaptive and user-friendly, all of which support the development of students' creative thinking skills. Therefore, technology integration in science learning plays an important role in improving creative thinking skills.

Furthermore, the application of technology in science learning, especially by using SAC, requires an approach that pays attention to the characteristics of good learning media. Zainil *et al.* (2019) mentioned that the SAC application allows the creation of learning media without the need for coding skills, which makes it easier for teachers to

design more creative and interactive learning experiences. More importantly, Limbong *et al.* (2022) underlined that effective learning media should have Self Instruction and Self Contained features, which means students can learn independently and thoroughly through the media. This supports students in developing creative thinking skills as they are encouraged to think deeply and critically, exploring science concepts independently. The overall features and characteristics of the learning media indicate that the use of SAC can be an effective tool in encouraging creative thinking skills in science subjects, while preparing students to be more adaptive to the development of knowledge and technology.

Creative thinking skills in science subjects is a very important ability to be developed among students, because it reflects the ability of individuals to solve various problems innovatively and form unique new ideas. This ability is not just about producing the right answer, but also how students can use their knowledge to create original and relevant solutions. According to Agustina and Noor (2016), creative thinking is a person's ability to generate new, unique, and relevant ideas in solving problems or creating something innovative. This definition is in line with the opinion of Rizqi *et al.* (2021) who state that creative thinking skills are the ability of an individual to solve problems simply according to their way of thinking, creating something new and unique. Furthermore, Kamilla (2018) added that creative thinking is closely related to aspects of intuitive and rational thinking that include the development of original and constructive ideas. This emphasis on creativity is particularly important in science learning, where students are encouraged to understand scientific concepts and apply knowledge innovatively. From these various definitions, it can be concluded that creative thinking skills in the context of science learning are essential to facilitate students in exploring and applying knowledge effectively.

The importance of creative thinking skills lies not only in the ability to develop innovative ideas, but also in the implementation in classroom learning practices. Marliani, N. (in Ulandari *et al.*, 2019) explained that this skill is the power to manifest or grow new things, unique in nature through ideas. It is a thinking ability that can bring new knowledge and new methods when understanding a scientific concept. Situmorang *et al.* (2023) emphasized that creative thinking is an activity to obtain a series of new and original ideas from concepts and knowledge that have been obtained. In the context of science learning, this skill enables students to translate scientific theories into practical solutions, building a bridge between theoretical knowledge and real applications in everyday life. Therefore, education that focuses on developing creative thinking skills in science subjects not only prepares students for academic challenges, but also prepares them for challenges in the real world. In conclusion, creative thinking skills in science subjects play a crucial role in helping students integrate and apply scientific knowledge in innovative and solutive ways.

Based on the description above, this study formulates the problem formulation, namely whether differentiated learning based on *Smart Apps Creator* (SAC) is effective on creative thinking skills in grade VI IPAS subjects in Wonogiri District State Elementary Schools. This study aims to determine the effectiveness of differentiated learning based on *Smart Apps Creator* (SAC) on creative thinking skills in grade VI IPAS subjects.

METHODS

This study uses a type of quantitative research with a true experimental method. Quantitative Research Methods, as stated by Sugiyono (2019) can be interpreted as a research method based on the philosophy of positivism, used to research on certain populations / samples, sampling techniques are generally carried out randomly, data collection using research instruments, data analysis is quantitative / statistical with the aim of testing predetermined hypotheses. The population in this study were all grade VI students in Wonogiri sub-district public schools using random sampling techniques or

random techniques in sampling. The results of sampling obtained as many as 69 grade VI students in Wonogiri sub-district State Elementary School. The research data collection used a description test technique, where the test material had first been tested for validity, reliability, size level, and differentiator. Analysis of research data using simple linear regression analysis and hypothesis testing with Independent Sample t-test to see the effectiveness of differentiated learning based on smart apps creator (sac) on creative thinking skills (Budiyono, 2016).

RESULTS AND DISCUSSION

Research Results

The data collected from the research field, in this study, were processed with the help of SPSS and as needed to answer the problem formulation. The processing stages, namely:

Prerequisite Test

Normality test

The normality test uses the Shapiro-Wilk normality test because the sample in this study is less than 100 (<100). This test is used to determine whether the distribution of data we have follows a normal distribution or not. Based on this method, it can be seen that the significance value is 0.884> 0.05. This means that the sample comes from a normally distributed population.

Homogeneity Test

The homogeneity test aims to show that the variance of two or more groups of data samples comes from the same population. Based on the homogeneity test using SPSS, it was concluded that the x2count value (1.473) < x2tabel (3.841). The results of the homogeneity test calculation can be concluded that the sample population is homogeneous.

Hypothesis Testing

Based on the prerequisite test, hypothesis testing was carried out in the study. Hypothesis testing uses the Paired Sample T-test test to assess whether there is a difference in mean values between two samples that are paired or related to each other.

Table 1. T-Test Result

		Paired Samples Test							
				Paired Differences				t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	SAC-based differentiated learning	-13,007	11,996	3,3279	-20,326	-5,828	2,504	67	,000

The results of the homogeneity test using SPSS in this study showed a Sig value. 0.000 <0.05 and the value of t count 2.504> t table 1.668. This means that rejecting h0 and accepting h1 or accepting the alternative hypothesis.

Simple Linear Regression Test

Simple linear regression test is a statistical method used to predict the value of a variable based on the value of other variables with the assumption that the relationship between the two is linear. Through the simple linear regression test, it can determine how

much contribution an experimental variable makes to changes in the control variable. Based on the results of the SPSS output, it can be seen that the correlation value (r) in the study is 0.508, while the coefficient of determination (R Square) is 0.849. This can be interpreted that there is a positive linear relationship between the two variables. Differentiated learning variables based on Smart Apps Creator (SAC) have an influence of 84.9% on creative thinking skills in grade VI IPAS subjects in Wonogiri District State Elementary Schools.

Discussion

Based on the statistical calculations above, there is a statistically significant relationship between the application of differentiated learning based on Smart Apps Creator (SAC) and the improvement of creative thinking skills of grade VI students. The correlation coefficient (r) value of 0.508 indicates a fairly strong positive linear relationship between the two variables. This can be interpreted that the higher the level of application of SAC-based learning, the higher the level of students' creative thinking skills. In addition, the coefficient of determination (R-squared) of 0.849 indicates that 84.9% of the variance in creative thinking skills can be explained by the application of SAC-based learning. This indicates that SAC-based learning has a huge contribution in improving students' creative thinking skills.

The t-test results also reinforce the opinion that there is a statistically significant relationship between the application of differentiated learning based on Smart Apps Creator (SAC) and the improvement of creative thinking skills of grade VI students. The significance value of 0.000 is much smaller than the significance level of 0.05, which indicates that the results obtained are not due to chance. Thus, the alternative hypothesis stating that there is a positive influence between SAC-based learning and creative thinking skills can be accepted. The calculated t value which is greater than the t table also supports the hypothesis.

The results of this study have very important implications for the development of learning in elementary schools, especially in science subjects. SAC-based learning has proven effective in improving students' creative thinking skills. In line with Suhartati's research (2021), it is explained that the use of the Android Smart Apps Creator (SAC) based learning model can increase students' creativity motivation, activity, and learning outcomes, especially in IPAS learning. According to Khoirudin, et al., (2021) the display presented by SAC is a combination of e-book and power point. The combination of e-book and power point provides an opportunity for the creation of electronic modules. Thus, a simple display makes it easy for students to use and learn the material in the media. Differentiated learning is a learning concept that accommodates every difference in student characteristics in the learning process according to the potential found in the school environment (Mulyawati et al., 2022; and Siagian et al., 2022). The impact is that students are able to learn more effectively because they can develop the potential that exists in these students. In line with Susdamayanti's research (2024), it explains that differentiated learning has an impact that is not only felt by the teacher. Teachers can measure the ability of students well by using an independent learning style that suits the needs of students. This makes learning proximate analysis material easier to understand and can help students become very creative and can explore their potential in the field of technology utilization.

CONCLUSIONS

This study shows that differentiated learning based on Smart Apps Creator (SAC) is effective in improving creative thinking skills in grade VI IPAS subjects in Wonogiri District State Elementary Schools. Through simple linear regression analysis, a significant positive relationship was found between the use of SAC and students' creative thinking skills. Learning with SAC contributed 84.9% influence to the improvement of students' creative thinking skills, indicating the high effectiveness of this approach. The

results of data analysis showed a correlation (R) value of 0.508, with a significant value of 0.000 which is smaller than 0.05, and a calculated t value of 2.504 which is greater than the t table of 1.668, thus supporting the acceptance of the alternative hypothesis that SAC-based differentiated learning is effective in the context of this study. This finding confirms that innovations in teaching methods, such as the use of digital applications, can substantially improve students' creative learning outcomes in primary schools.

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