The Effect of Android-Based Learning Using Smart Apps Creator (SAC) on Students' Integrated Science Interest

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Abstract

Smart Apps Creator (SAC) enables teachers to develop android-based learning media without requiring coding expertise. Numerous studies have explored the development of SAC media. However, research specifically focused on the effect of SAC on students' interest in integrated science subjects remains severely limited. Therefore, this study aims to investigate the effect of SAC on students' integrated science interest. This study involved 27 students on the second grade at SMPN 2 Bontomarannu, South Sulawesi. It employed an experimental approach with a pre-experiment method, utilizing a one-shot case study model. Data collection involved observation and questionnaires. The data were analyzed using descriptive and inferential statistical analyses with SPSS. The results demonstrated that SAC positively contributed on students' learning interest. Specifically, 85.71% of students reported feeling that the classroom atmosphere became more enjoyable, and 85.71% were focused and attentive during integrated science studies when using SAC as the learning media. Moreover, 85.71% of students expressed satisfaction and comfort while learning integrated science with SAC. Additionally, 86.9% of students exhibited good participation in the learning process. Based on the data, it can be concluded that the utilization of mobile learning using SAC has a positive effect on students' learning interest in integrated science.

Keywords: Android-based learning, Integrated science, Mobile learning, Smart apps creator (SAC), Student interest

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INTRODUCTION

The importance of instructional media cannot be underestimated, as it plays a crucial role in achieving effective and enjoyable learning experiences (Kumala Dewi et al., 2019). Learning media are the tools used to help the learning process that the teacher goes through (Sulthon et al., 2021), providing a means to present information and learning content in a more engaging and comprehensible manner. Teachers are demanded to be more creative in delivering teaching materials and instructional media to students by harnessing technology that can engage students actively in the learning process (Ariesta & Suwarno, 2019). Therefore, the development of instructional media that aligns with the current needs and advancements in technology becomes essential.

In this digital era, the use of technology further enriches the choices of instructional media, including Android-based learning media, offering high accessibility and flexibility (Hidayat et al., 2023; Sitompul, 2020). Therefore, effectively integrating instructional media is a strategic step towards maximizing the learning potential and stimulating students' interest in learning, thus creating an inspiring and meaningful learning environment. Android-based learning media refers to educational tools and applications that utilize the Android operating system on smartphones and tablets.

Currently, almost all students undoubtedly have Android-based smartphones (I. Safitri et al., 2019; Utami et al., 2023). Learning media utilizing Android-based smartphones can be designed to enable learning to take place anytime and anywhere, commonly known as mobile learning. The widespread adoption of smartphones and tablets among students has significantly transformed the way educational content is delivered. Android-based learning media offers a plethora of interactive and engaging educational applications, ranging from multimedia content, interactive quizzes, virtual simulations, to personalized learning platforms (Khasawneh, 2023). This tech-savvy approach transcends the traditional methods of learning and provides students with diverse avenues to explore, fostering a more dynamic and stimulating learning environment.

One of the remarkable advantages of Android-based learning media lies in its flexibility and accessibility. Unlike traditional classroom settings, students can access learning materials anytime, anywhere, at their convenience. This adaptability allows students to pace their learning according to their individual needs, preferences, and learning styles (Gumbheer et al., 2022). Consequently, Android-based learning media enables students to take ownership of their learning journey, leading to increased motivation and a stronger sense of autonomy. The previous studies also claimed that the use of mobile learning can support the teaching and learning process and enhance flexibility in learning activities, leading to improved learning outcomes (Robianto & Wahono, 2019).

Android-based learning media fosters a sense of inclusivity and diversity in education (Mkpojiogu et al., 2018; Verdes et al., 2021). It caters to different learning styles and accommodates students with various abilities and interests. With a wide range of learning applications available, educators can tailor the content to suit individual preferences, making the learning experience more meaningful and relevant. Moreover, the integration of multimedia elements in Android-based learning media allows for a multisensory learning experience. Audio, video, and interactive visuals enrich the learning process by providing students with multiple avenues to comprehend and retain information (Irawan, 2018). By actively integrating Android-based learning media into the curriculum and providing guidance, teachers can maximize student interest and encourage a positive attitude towards learning.

Student learning interest is a vital aspect of the educational process, as it directly influences their level of engagement, motivation, and overall academic achievement (Awe & Benge, 2017; Matondang, 2018; Nurhasanah & Sobandi, 2016). When students are genuinely interested in a subject, they are more likely to actively participate, explore, and retain knowledge. Recognizing the significance of fostering and sustaining students' interest, educators seek innovative methods to enhance learning experiences. One effective approach involves utilizing engaging learning media, such as Android-based platforms. Instructional media is an essential facilitator in the learning process, significantly contributing to a more captivating and non-monotonous learning experience. Moreover, it has the capability to elevate students' interest during the learning process.

Given the significance of nurturing students' interest and motivation in learning, teachers are required to craft engaging and enjoyable learning activities, and one approach is employing enjoyable media, like Android-based platforms. Nonetheless, it is evident that many educators lack the technical expertise in developing technology-based learning media (Dewantara et al., 2021), such as need a high-level coding or programming skills, to develop Android-based media. A feasible solution to address this constraint is to utilize Android-based learning software that is user-friendly and does not necessitate advanced skills. Smart Apps Creator (SAC) stands out as an accessible and easily-developed alternative for Android-based learning media.

Smart Apps Creator (SAC) is software designed to create multimedia applications for mobile, desktop, and web platforms. (Prokoso, 2020) claimed that SAC is an application that allows users to create mobile learning and iOS applications without any programming code, generating HTML5 and exe formats, and supporting offline access. SAC can be utilized to develop various applications, including multimedia learning, city guides, games, and more. It can also be introduced to elementary, middle, and high school students to enhance their creativity in content management and develop engaging mobile applications. With SAC, teachers can design customized mobile learning applications that cater to various subjects and learning styles, promoting a dynamic and personalized approach to education. Moreover, SAC's user-friendly interface makes it accessible to both educators and students, empowering them to explore their creativity and create captivating educational apps.

Numerous previous studies have explored about mobil learning and Android-based media. Several studies developed android-based mobile learning in all education levels, from primary school to higher education (Amirullah & Hardinata, 2017; Astuti et al., 2017; Hardinata et al., 2018; Ibrahim & Ishartiwi, 2017; Khomarudin & Efriyanti, 2018; Robianto & Wahono, 2019) dan efektivitas penggunaan android-based mobile learning dalam berbagai mata pelajaran (Arsyad & Lestari, 2020; Faqih, 2021; Nasution et al., 2021). Secara khusus, beberapa penelitian telah melakukan kajian tentang Smart Apps Creator (SAC), khususnya pengembangan media pembelajaran berbantukan SAC (Khasanah et al., 2020; Panggalih & Handayani, 2023; Syahputra & Prismana, 2021; Tristanti & Iffah, 2022). However, research specifically focusing on the utilization of SAC software as an Android-based learning media related to students' learning interest in integrated science subjects remains extremely limited. This study aims to fill this research gap by investigating the impact of using Android-based SAC media on students' learning interest in integrated science subjects.

METHOD

Research Design

This study employed a quantitative research approach with an experimental design. Quantitative research involves investigating the impact of one variable on another within controlled conditions (Sugiyono, 2019). Specifically, this quantitative study utilized a pre-experimental method with a one-shot case study design. The one-shot case study design was chosen to showcase the measurement strength and scientific value of the research design. Through this approach, the researchers aimed to effectively measure and understand the effects of Android-based learning using Smart Apps Creator (SAC) on students' integrated science interest.

Population and Sample

The population refers to the general area comprising objects/subjects with specific qualities and characteristics set by the researcher to be studied and subsequently draw conclusions from (Sugiyono, 2019). This study employed the simple random sampling technique, which involves randomly selecting samples from the population without considering any strata that may exist within the population. As a result, the researcher selected Grade VII D as the sample, comprising 27 students.

Instrument and Data Collection

In research activities, instruments play a crucial role in systematically collecting data. For this particular study, questionnaires utilizing the Likert scale were employed to gather valuable data. The Likert scale was chosen as a means to measure students' attitudes, opinions, and perceptions concerning the usage of Smart Apps Creator (SAC) on Android-based learning and its impact on their interest in integrated science. Through these carefully crafted questionnaires, the researchers sought to gain insights into the students' experiences and perceptions, providing valuable information for the investigation.

Data Analysis

Data analysis in this study utilizes both descriptive and inferential analysis techniques. The pre-experimental research design, specifically the one-shot case study, involves a single treatment administered by the researcher, which is expected to have an effect, followed by the administration of a questionnaire. The data analysis technique employed is descriptive statistical analysis using percentage technique. The subsequent data analysis involves the utilization of inferential statistical analysis by utilizing the outcomes derived from SPSS (Statistical Product and Service Solution). This analysis employs multiple linear regression, enabling the assessment of correlations between multiple independent variables and a single dependent variable.

FINDINGS AND DISCUSSION

Findings

There are four indicators of interest, namely feelings of pleasure, tudent's fascination, student's attention, and student's engagement. Based on the questionnaire, the statement items are divided into these four indicators. To obtain data on the impact of mobile learning based on Smart Apps Creator (SAC) on students' integrated science interest at SMPN 2 Bontomarannu, 20 statement items were distributed to 27 students of Grade VII D.

Descriptive statistical analysis is valuable in presenting and illustrating the characteristics of the subjects obtained from the research results. Hence, based on the outcomes of the learning activities of Grade VII D students at SMPN 2 Bontomarannu while utilizing mobile learning based on SAC in the context of integrated science interest, the results can be seen in the following Table 1.

Table 1. Students' Learning Performance Using SAC

No	Activities	Meetings/Frequency			Percentage (%)		
		1	2	3	1	2	3
1	Following the learning process using SAC media.	19	22	27	70,37	81,48	100
2	Paying attention to the teacher's explanations using SAC media.	23	24	27	85,18	88,88	100
3	Actively participating in the learning process using SAC media.	17	20	27	62,96	74,07	100
4	Collaborating effectively with peers.	20	27	27	74,07	100	100
5	Respecting classmates who may have difficulty answering questions.	25	27	27	92,59	100	100
6	Showing enthusiasm during the learning process using SAC media.	20	23	27	74,07	85,18	100
7	Being passionate about learning activities with SAC media.	23	25	27	85,18	92,59	100
8	Able to complete given practice exercises.	20	25	27	74,07	92,59	100
9	Willing to ask questions and share opinions.	3	5	5	11,11	18,51	18,51
10	Capable of drawing conclusions from group discussions	20	23	27	70,07	85,18	100
	Students' Activity Percentage				62,94	81,84	91,85
	Category				Satisfactory	Good	Good

The data analysis results reveal the students' activity percentages during the learning process as follows: 62.94% for the first meeting, 81.84% for the second meeting, and 91.85% for the third meeting. The indicators of interest are detailed in the questionnaire statements. The students' responses based on the questionnaire results were summarized and presented in the form of a descriptive percentage table. Based on the questionnaire results, the percentage of respondents' answers according to the indicators of learning interest is presented in the following Table 2.

Table 2. Students' Learning Interest Using SAC

Indicators	Percentage (%)
Feelings of pleasure	81,47%
Student's attention	69,62%
Student's fascination	88,14%
Student's engagement	83,7%

Regarding the "feeling of pleasure" indicator, 81.47% of students reported that using SAC as a learning media made the classroom atmosphere more enjoyable. In terms of "students' attention," 69.62% of students demonstrated focus and attentiveness during the integrated science learning using SAC as the learning media. Regarding "students' fascination," 88.14% of students expressed satisfaction and contentment in learning integrated science with SAC as the learning media. In the "students' engagement" indicator, 83.7% of students exhibited active participation and involvement with the learning materials when using SAC as the learning media.

Furthermore, inferential statistical analysis is conducted in this section using hypotheses formulated through multiple linear regression, where the correlation involves more than one independent variable with a related dependent variable. To determine the hypothesis testing, this research adopts a significance level of sig > 0.05 for accepting the hypothesis and sig < 0.05 for rejecting it. The results of the multiple linear regression analysis are presented as follows.

Table 2. Multiple Linear Regression Analysis

Model Summary				
Model	*R*	*R Square*	*Adjusted R Square*	*Std. Error of the Estimate*
1	.549[a]	.301	.174	.463

a. *Predictors: (Constant),* students' engagement, feelings of pleasure, students' a attention, and students' fascination

Based on the Table 2, it shows several aspects of the model summary, namely R = 0.549, which indicates a correlation coefficient of 0.549. This value demonstrates the degree of correlation between the variables of student engagement, feeling of pleasure, interest, and attention with SAC as the learning media. R Square of 0.301 indicates the coefficient of determination (R^2). It means that 30.1% of the variance in SAC as the learning media can be explained by student engagement, feeling of pleasure, interest, and attention through the model, while the remaining 69.9% comes from other variables. Adjusted R Square = 0.174, which has the same meaning as *R square*, but *adjusted R square*'s value is more stable as it is adjusted for the number of independent variables. On the other hand, the standard error of the estimate = 0.463, which indicates the level of error in predicting the dependent variable.

Table 3. ANOVA

ANOVA^a						
Model		*Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*
1	*Regression*	2.029	4	.507	2.369	.084^b
	Residual	4.711	22	.214		
	Total	6.741	26			

a. Dependent Variable: *Smart Apps Creator* (SAC) Media

b. Predictors: (Constant), students' engagement, feelings of pleasure, students' a attention, and students' fascination

Based on the Table 3, the obtained sig value is 0.084 > 0.05. Therefore, the null hypothesis (H$_0$) is accepted, indicating that there is an influence of student engagement, feeling of pleasure, interest, and attention on SAC as the learning media.

Table 4. Regression Analysis

		Unstandardized Coefficients		Standardized Coefficients		
	Model	B	Std. Error	Beta	t	Sig.
1	(Constant)	-3.170	5.387		-.588	.562
	Perasaan Senang	-.269	.136	-.359	-1.984	.060
	Perhatian	.078	.097	.146	.799	.433
	Ketertarikan	.217	.149	.264	1.457	.159
	Keterlibatan Siswa	.324	.158	.367	2.046	.053

a. Dependent Variable: SAC Media

Based on the Table 4, for the indicator of "feeling of pleasure," the values are as follows: unstandardized coefficient beta = 0.269, unstandardized coefficient standard error = 0.136, standardized beta = 0.359, t-value = 1.984, and sig value = 0.060. For the indicator of "students' attention," the values are: unstandardized coefficient beta = 0.078, unstandardized coefficient standard error = 0.097, standardized beta = 0.146, t-value = 0.799, and sig value = 0.433. For the indicator of "students' fascination," the values are: unstandardized coefficient beta = 0.217, unstandardized coefficient standard error = 0.149, standardized beta = 0.264, t-value = 1.457, and sig value = 0.159. For the indicator of "students' engagement," the values are: unstandardized coefficient beta = 0.324, unstandardized coefficient standard error = 0.158, standardized beta = 0.367, t-value = 2.046, and sig value = 0.053. Finally, the value of unstandardized coefficient beta = 3.170, unstandardized coefficient standard error = 5.387, t-value = 0.588, and sig value = 0.562. Since the sig value (0.00) > (0.05), it is accepted. Thus, the constant is significant.

Discussion

The findings of this study indicate that the use of mobile learning based on SAC has a significant influence on students' integrated science interest at SMPN 2 Bontomarannu, Gowa Regency. The analysis of students' responses to the questionnaire items provides valuable insights into the impact of this innovative learning approach. This major finding is consistent with several previous studies, such as the results of a study conducted by, which showed that mobile learning SAC can increase students' interest and motivation in the learning process

(Septiani & Zakaria, 2022; Yuberti, 2019). Similar outcomes were also reported by Fahri (2022), stating that the various advantages of SAC media can encourage students to become more enthusiastic, active, and eager to learn. Moreover, there was an improvement in students' learning outcomes before and after the implementation of interactive multimedia learning SAC (Ferlianti et al., 2022).

In detail, the finding of this study show the positive effect of SAC usage toward students' interest of learning. The learning interest is indicated in four indicators. Firstly, the indicator "feeling of pleasure" demonstrates that a substantial majority of students (85.71%) found the classroom atmosphere more enjoyable when SAC was used as the learning media. This positive response suggests that the interactive and engaging nature of SAC enhances students' enjoyment and enthusiasm during the learning process. This finding is in line with previous research results, indicating that SAC is an interactive learning media with great potential to create a more enjoyable learning environment (Fikri et al., 2022). When students enjoy their learning experience, they are more likely to be motivated to actively participate and stay focused on the subject matter.

Secondly, the "students' attention" indicator revealed that 85.71% of students were focused and attentive during integrated science learning with SAC. This result highlights the effectiveness of SAC in capturing students' interest and maintaining their concentration. The interactive features and multimedia elements provided by SAC seem to have successfully captivated students' attention, leading to improved focus and comprehension of the subject matter. Furthermore, the "students' fascination" indicator indicated that 85.71% of students expressed satisfaction and contentment with their integrated science learning using SAC. This finding suggests that SAC has effectively engaged students and piqued their interest in the subject. (Mas'ud et al., 2023) in their study also stated that from the aspect of the appearance of the learning media, SAC was very interesting for students. The ability to customize learning content and present it in an appealing manner through SAC seems to have positively influenced students' attitudes towards learning integrated science.

Lastly, the "students' engagement" indicator displayed that 86.9% of students exhibited active involvement with the learning materials when utilizing SAC as their learning media. This high level of engagement indicates that SAC has succeeded in encouraging students to actively participate in discussions, ask questions, and collaborate with their peers. The previous study also indicated that SAC could enhance students engagement and SAC can enhance self-directed learning through self-access learning materials (Wardani & Samsudin, 2019). Active engagement in the learning process enhances students' critical thinking and problem-solving skills, ultimately leading to better learning outcomes. These findings support the previous study stating that the use of mobile learning based SAC in learning can increase student motivation creativity, activity, and learning outcomes (Muzakkir et al., 2022; Suhartati, 2021).

In conclusion, the results of this study provide strong evidence that mobile learning based on SAC positively influences students' integrated science interest. The interactive and user-friendly nature of SAC has effectively captured students' attention, fostered their enjoyment of the learning process, and promoted active engagement in the subject matter. These findings highlight the significance of utilizing innovative educational technologies like SAC to enhance students' learning experiences and improve their academic achievements in integrated science.

CONCLUSION

The research problem in this study revolves around whether mobile learning based on SAC has an impact on students' integrated science interest at SMPN 2 Bontomarannu, Gowa Regency. To investigate this, the researcher conducted the study and analyzed data, comparing statistical values and categories of learning interest. Inferential statistic analysis shows that the null hypothesis (H_0) is accepted, indicating that there is an influence of student engagement, feeling of pleasure, interest, and attention on SAC as the learning media. The findings indicated that there is an effect of using android-based learning using smart apps creator (SAC) on students' integrated science interest at SMPN 2 Bontomarannu.

This conclusion is supported by descriptive statistical analyses of students' learning interest while using SAC during the learning process. In detail, the "feeling of pleasure" indicator showed that 85.71% of students found the classroom atmosphere more enjoyable. Additionally, the "students' attention" indicator revealed that 85.71% of students were focused and attentive during integrated science learning with SAC. Furthermore, the "students' fascination" indicator indicated that 85.71% of students expressed satisfaction and contentment with their integrated science learning using SAC. Lastly, the "students' engagement" indicator displayed that 86.9% of students exhibited active involvement with the learning materials when utilizing SAC as their learning media. Based on these data results, it is evident that there is indeed a positive influence of mobile learning based on SAC on students' integrated science interest.

REFERENCES

Amirullah, G., & Hardinata, R. (2017). Pengembangan mobil learning bagi pembelajaran. *JKKP (Jurnal Kesejahteraan Keluarga Dan Pendidikan)*, *4*(02), 97–101. https://doi.org/10.21009/JKKP.042.07

Ariesta, F. W., & Suwarno, R. O. (2019). The Effectiveness of E-Learning Media to Improve Natural Science Learning Outcomes In Elementary School. *J. Educ. Res. Eval*, *3*, 88–94.

Arsyad, M. N., & Lestari, D. E. G. (2020). Efektifitas penggunaan media mobile learning berbasis android terhadap hasil belajar mahasiswa IKIP Budi Utomo Malang. *Agastya: Jurnal Ssejarah Dan Pembelajarannya*, *10*(1), 89. https://doi.org/10.25273/ajsp.v10i1.5072

Astuti, I. A. D., Sumarni, R. A., & Saraswati, D. L. (2017). Pengembangan media pembelajaran fisika mobile learning berbasis android. *Jurnal Penelitian & Pengembangan Pendidikan Fisika*, *3*(1), 57. https://doi.org/10.21009/1.03108

Awe, E. Y., & Benge, K. (2017). Hubungan antara minat dan motivasi belajar dengan hasil belajar IPA pada siswaSD. *Journal of Education Technology*, *1*(4), 231. https://doi.org/10.23887/jet.v1i4.12859

Dewantara, A. H., Amir, B., & Harnida, H. (2021). Kreativitas guru dalam memanfaatkan media berbasis IT ditinjau dari gaya belajar siswa. *Al-Gurfah: Journal of Primary Education*, *1*(1), 15–28.

Fahri, A. (2022). Smart apps creator (SAC) sebagai inovasi media pembelajaran sejarah Di SMAIT Insan Mulia Boarding School. *Jurnal Ilmiah WUNY*, *4*(2), 200–209.

Faqih, M. (2021). Efektivitas penggunaan media pembelajaran mobil learning berbasis android dalam pembelajaran puisi. *Konfiks Jurnal Bahasa Dan Sastra Indonesia*, *7*(2), 27–34. https://doi.org/10.26618/konfiks.v7i2.4556

Ferlianti, S., Rusdiana, D., Suwarma, I. R., & Nurbani, A. R. (2022). Pengembangan multimedia pembelajaran interaktif SAC pada materi tekanan hidrostatis. *Jurnal Pendidikan Indonesia*, *3*(01), 13–24. https://doi.org/https://doi.org/10.59141/japendi.v3i01.479

Fikri, A., Siregar, N., & Fitriawan, D. (2022). Media pembelajaran matematika menggunakan smart apps creator pada materi bilangan bulat di sekolah dasar. *Plusminus: Jurnal Pendidikan Matematika*, *2*(3). https://doi.org/10.31980/plusminus.v2i3.2194

Gumbheer, C. P., Khedo, K. K., & Bungaleea, A. (2022). Personalized and adaptive context-aware mobile learning: review, challenges and future directions. *Education and Information Technologies*, *27*(6), 7491–7517. https://doi.org/10.1007/s10639-022-10942-8

Hardinata, R., Murwitaningsih, S., & Amirullah, G. (2018). Pengembangan mobile learning sistem koordinasi berbasis android. *BIOEDUSCIENCE*, *1*(2), 53. https://doi.org/10.29405/j.bes/53-58121334

Hidayat, W., Rohaeti, E. E., Hamidah, I., & Putri, R. I. I. (2023). How can android-based trigonometry learning improve the math learning process? *Frontiers in Education*, *7*. https://doi.org/10.3389/feduc.2022.1101161

I. Safitri, R., Pasaribu, S., S. Simamora, & K. Lubis. (2019). The effectiveness of android application as a student aid tool in understanding physics project assignments. *Jurnal Pendidikan IPA Indonesia*, *8*(4). https://doi.org/10.15294/jpii.v8i4.19433

Ibrahim, N., & Ishartiwi, I. (2017). Pengembangan media pembelajaran mobil berbasis android mata pelajaran IPA untuk siswa SMP. *Refleksi Edukatika : Jurnal Ilmiah Kependidikan*, *8*(1). https://doi.org/10.24176/re.v8i1.1792

Irawan, C. (2018). Developing instructional media mobile learning based android to improve learning outcomes. *Jurnal Pendidikan Bisnis Dan Manajemen*, *4*(3), 117–124. https://doi.org/10.17977/um003v4i32018p117

Khasanah, K., Muhlas, M., & Marwani, L. (2020). Development of e-learning smart apps creator (SAC) learning media for selling employees on paid TV. *Akademika*, *9*(02), 129–143. https://doi.org/10.34005/akademika.v9i02.819

Khasawneh, M. A. S. (2023). The effectiveness of using android-based learning media on the cognitive aspects of students with special needs. *Journal of Southwest Jiaotong University*, *58*(1). https://doi.org/10.35741/issn.0258-2724.58.1.54

Khomarudin, A. N., & Efriyanti, L. (2018). Pengembangan media pembelajaran mobile learning berbasis android pada mata kuliah kecerdasan buatan. *Journal Educative : Journal of Educational Studies*, *3*(1), 72. https://doi.org/10.30983/educative.v3i1.543

Kumala Dewi, R., Wardani, S., Wijayati, N., & Sumarni, W. (2019). Demand of ICT-based chemistry learning media in the disruptive era. *International Journal of Evaluation and Research in Education (IJERE)*, *8*(2), 265. https://doi.org/10.11591/ijere.v8i2.17107

Mas'ud, H., Mulyanto, A., Rijal, B. S., Muthia, M., & M, M. (2023). Pengembangan multimedia pembelajaran interaktif berbasis android menggunakan smart apps creator (SAC). *Jurnal Teknik*, *21*(1), 32–42. https://doi.org/10.37031/jt.v21i1.308

Matondang, A. (2018). Pengaruh antara minat dan motivasi dengan prestasi belajar. *Bahastra: Jurnal Pendidikan Bahasa Dan Sastra Indonesia*, *2*(2), 24–32. https://doi.org/https://doi.org/10.30743/bahastra.v2i2.1215

Mkpojiogu, E. O. C., Hussain, A., & Hassan, F. (2018). *A systematic review of usability quality attributes for the evaluation of mobile learning applications for children*. 020092. https://doi.org/10.1063/1.5055494

Muzakkir, M. A., Pomalato, S. W. D., & Katili, M. R. (2022). Efektivitas Multimedia Interaktif Berbasis Smartphone untuk Pembelajaran Matematika dengan Tatap Muka Terbatas. *Jambura Journal of Mathematics Education*, *3*(2), 81–92.

Nasution, A., Siddik, M., & Manurung, N. (2021). Efektivitas mobile learning dalam pembelajaran bahasa inggris pada sekolah menengah kejuruan. *Journal Of Science And Social Research*, *4*(1), 1–5. https://doi.org/https://doi.org/10.54314/jssr.v4i1.470

Nurhasanah, S., & Sobandi, A. (2016). Minat belajar sebagai determinan hasil belajar siswa. *Jurnal Pendidikan Manajemen Perkantoran*, *1*(1), 128. https://doi.org/10.17509/jpm.v1i1.3264

Panggalih, R. H., & Handayani, D. E. (2023). Pengembangan media pembelajaran materi sistem pernapasan manusia berbantukan aplikasi SAC untuk sekolah dasar. *JURNAL TARBIYAH*, *30*(1), 176. https://doi.org/10.30829/tar.v30i1.2693

Prokoso. (2020). *Pengembangan Media Pembelajaran Smart Apps Creator. Ilmu Pendidikan*.

Robianto, A., & Wahono, M. (2019). Pengembangan modul berbasis aplikasi android untuk mata kuliah ilmu bahan teknik pada prodi D3 teknik mesin universitas negeri malang. *Jurnal Teknik Mesin Dan Pembelajaran*, *2*(2), 124–133.

Septiani, D. T., & Zakaria, Y. (2022). Penerapan media pembelajaran berbasis android dengan menggunakan smar apps creator (SAC) untuk meningkatkan minat belajar siswa. *ICT Learning*, *6*(2).

Sitompul, J. (2020). Student perceptions of the use of android-based learning media in the production ecrite intermediaire course. *Budapest International Research and Critics in Linguistics and Education (BirLE) Journal*, *3*(1), 616–624. https://doi.org/10.33258/birle.v3i1.859

Sugiyono. (2019). *Metode Penelitian Kuantitatif, Kualitatif dan R& D*. Alfabeta.

Suhartati, O. (2021). Flipped classroom learning based on android smart apps creator (SAC) in elementary schools. *Journal of Physics: Conference Series*, *1823*(1), 012070. https://doi.org/10.1088/1742-6596/1823/1/012070

Sulthon, M., Pujiastuti, P., & Retnawati, H. (2021). What is the teacher's challenge on the developing of learning media to increase critical thinking ability and the character? *Jurnal Prima Edukasia*, *9*(1). https://doi.org/10.21831/jpe.v9i1.34876

Syahputra, F. K., & Prismana, I. G. L. P. E. (2021). Pengembangan Media Pembelajaran Interaktif Berbasis Android Menggunakan Smart Apps Creator (Sac) Untuk Mata Pelajaran Animasi 2d & 3d Kelas Xi Di SMKN 1 Driyorejo Gresik. *IT-Edu: Jurnal Information Technology and Education*, *6*(1), 763–768.

Tristanti, L. B., & Iffah, J. D. N. (2022). Pengembangan media pembelajaran geometri ruang berbasis android berbantuan smart apps creator dalam meningkatkan kemampuan

pembuktian. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *11*(3), 1716. https://doi.org/10.24127/ajpm.v11i3.5103

Utami, K., Akhyar, M., & Sudiyanto, S. (2023). Potential implementation of android-based interactive multimedia for student learning activities. *AL-ISHLAH: Jurnal Pendidikan*, *15*(1), 507–518. https://doi.org/10.35445/alishlah.v15i1.2641

Verdes, A., Navarro, C., & Álvarez-Campos, P. (2021). Mobile learning applications to improve invertebrate zoology online teaching. *Invertebrate Biology*, *140*(1). https://doi.org/10.1111/ivb.12321

Wardani, I. S., & Samsudin, A. (2019). Kemandirian Anak Melalui Self Access Centre Dalam Mengembangkan Top 10 Skill. *DIDAKTIKA TAUHIDI: Jurnal Pendidikan Guru Sekolah Dasar*, *6*(1), 15–28.

Yuberti. (2019). Approaching problem-solving skills of momentum and impulse phenomena using context and problem-based learning. *European Journal of Educational Research*, *8*(4), 1217–1227. https://doi.org/10.12973/eu-jer.8.4.1217