IRJE |Indonesian Research Journal in Education| |Vol. 9| No. 2|Dec|Year 2025|

The development of smart apps creator learning media to improve ipas learning outcomes

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Abstract

This research is included in research and development (R&D) by applying the ADDIE model. This research is motivated by the fact that teachers are not optimal in using technology-based learning media. This causes low learning outcomes for the fourth-grade students in the material of my area and its natural wealth. This study aims to test the validity, practicality, and effectiveness of learning materials developed by Smart Apps Creator (SAC) in enhancing learning outcomes. The population involved in this research is the fourth-grade students of SD Negeri Klumprit 04, a total of 32 students. The data collection techniques include test and non-test methods, such as observation, interviews, questionnaires, and documentation. The study results show that the Smart Apps Creator (SAC) learning media was developed with researcher-recorded voiceovers and self-taken images. The feasibility assessment indicates very feasible criteria, with scores from media experts (88%), material experts (83%), students (98%), and teachers (94%). Its effectiveness is demonstrated by a significant improvement in student learning outcomes, with an N-Gain score of 0.7007 (high category).

Keywords

Ipas, learning outcomes, smart apps creator

Article History

Received 19 February 2025
Accepted 30 July 2025

How to Cite

Reza, R. P., & Putra, G. M. C. (2025). The development of smart apps creator learning media to improve ipas learning outcomes. *Indonesian Research Journal in Education |IRJE|*, *9*(2), 914 - 925. https://doi.org/10.22437/irje.v9i02.41931

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Introduction

Science and technology are evolving quickly and broadly, impacting every aspect of life, including education (Aditya et al., 2021). Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble morals, and skills needed by themselves, society, nation, and state (Law no. 20 of 2003, article 1). Education needs and must be developed in several aspects of cognitive science; it can be categorized as satisfactory if education can educate the life of a nation. Based on the explanation of education, it is a human process of gaining knowledge and expertise to survive in line with the rapid growth of the technological era (Trust, 2018).

The development of science has given birth to various technologies, including education (Sa'odah et al., 2022). In the era of Society 5.0, the world of education demands digital technology in the teaching and learning process, both for teachers and students (Ermawati et al., 2024). Technology in the learning process can help students learn, provide a new atmosphere, and support learning activities. Technology has become integral to students' lives (Sutrisni et al., 2022). The presence of technology changes the way information is delivered to students and creates new opportunities for more interactive learning experiences (Khasanah & Rusman, 2021). The use of technology in elementary schools also makes it easier for teachers to design and implement the learning process. In addition, the use of technological devices also contributes to increasing the effectiveness of teacher performance in teaching (Jannah et al., 2020). Therefore, technological advances that impact the world of education will change how students learn, both in the classroom and at home. Technology in education can improve the quality of learning and create a new atmosphere for teachers and students, including understanding science and science subjects (Mulyoto et al., 2022).

IPAS is a mandatory subject at the elementary school level, aimed at providing students with the skills to manage their natural and social environments effectively and holistically (Surul & Septiliana, 2023). However, when implementing IPAS, students often encounter various obstacles that they must overcome to achieve optimal learning goals. Some common obstacles encountered in learning IPAS include using less varied learning methods, low student participation in the learning process, limited resources and facilities from schools, lack of availability of books and references, and lack of supporting learning media (Komariah et al., 2023).

Learning media serve as a tool that assists teachers in helping students grasp the material more easily, simplifying complex concepts, and enhancing the effectiveness and efficiency of achieving learning objectives (Puspitarini & Hanif, 2019). Learning media are integral to teaching and learning and crucial for achieving educational objectives (Pawani et al., 2021). Therefore, learning media development is needed to increase students' interest in learning and make learning more interesting (Mairina & Hadiyanto, 2022). Especially in today's digital era, various technologies can support this creation. The use of technology is expected to support students in mastering various fields of science. This mastery encourages the educator's creativity, improves the learning process's quality, and creates a more enjoyable learning atmosphere (Chairunnisa & Kasriyati, 2021). Therefore, learning media needs to be combined with modern technology, according to the Minister of Education and Culture's rules, which encourage the application of technology in learning activities.

Based on the interviews and observations conducted by researchers in the fourth-grade of SD Negeri Klumprit 04, several problems were found during IPAS learning, including the fact that teachers still use a learning model that dominates lectures, questions, answers, and discussions. Teachers still dominate the material delivery, so children are bored with learning science. Lack of interest in social studies learning impacts their learning outcomes. IPAS learning is supposed to be designed with interesting and fun learning, but many teachers still cannot utilize effective learning media to overcome this challenge. Without the support of the learning media, the learning process cannot run optimally and efficiently, especially if the teaching method used is only in the form of lectures (Selvi & Cosan, 2018). Based on the learning conditions that have not taken place effectively, the researchers conclude that the design of appropriate learning media is essential to achieve instructional goals. Therefore, the researchers present a product as learning media developed using Smart Apps Creator (SAC).

Smart Apps Creator (SAC) is software that allows users to create application-based learning media without having programming skills (Al Haq et al., 2024). This application can be run through a smartphone, PC, or laptop (Suhartati, 2021). The learning media produced with Smart Apps Creator (SAC) can create a more interesting and fun learning atmosphere, so students are not bored due to monotonous learning media (Sagala & Simanungkalit, 2022). In addition, developers can integrate text, images, and videos into a single unit through interactive multimedia (Yulianti & Sudrajat, 2023). Digital learning applications allow teachers to earn additional income while helping them become more proficient in communicating and interacting through digital media (Khotima et al., 2022). Based on this, researchers are encouraged to develop Android-based learning media using Smart Apps Creator (SAC) to help students understand the material more effectively.

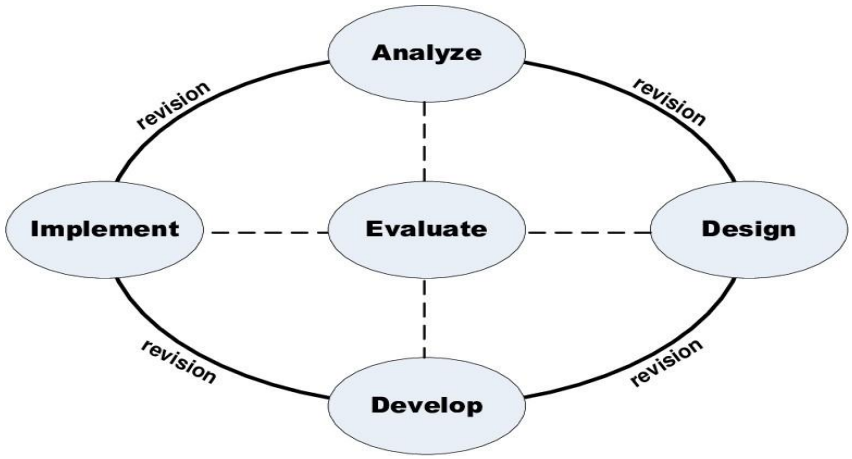
Previous studies have demonstrated the effectiveness of using *Smart Apps Creator* (SAC) as a learning medium. Elviana and Julianto (2022) proved that using Smart Apps Creator media is effective in temperature and heat materials. Another research was conducted by Wati (2022), proving that Smart Apps Creator learning media is feasible and effective for learning. Muhaimin and Zumrotun (2023) also proved that the Smart Apps Creator (SAC) learning media on the material on units of measurement is considered feasible and effective for application in learning activities.

Based on the background that has been described, the purpose of this research is to develop Smart *Apps Creator* (SAC)-based learning media to improve the learning outcomes of the fourth-grade students of SD Negeri Klumprit 04 in science by knowing the development of media design, media feasibility, and the effectiveness of *Smart Apps Creator* (SAC) media.

Methodology

This research employs the research and development (R&D) method. R&D is basic research aimed at developing products and evaluating their effectiveness. The R&D model focuses on making a product, where this research produces electronic learning media based on *Smart Apps Creator* (SAC) (Sugiyono, 2021), which is then tested for feasibility. The ADDIE model guides the process of developing this learning media. The ADDIE development model includes five main stages: analysis, design, development, implementation, and evaluation (Spatioti et al., 2022).

Figure 1. *ADDIE development procedure*



The first stage is analysis, where the researchers identify the needs of teachers and students through a needs assessment questionnaire. Additionally, an interview was conducted with the fourth-grade teacher at SD Negeri Klumprit 04. During this stage, the researchers also examined the urgency of developing learning media and its alignment with the research subjects' needs, ensuring that the media created could effectively address the identified issues. The second stage is the design phase, which centers on developing learning media using Smart Apps Creator (SAC). The analysis of teachers' and students' needs guides the design. The process involves selecting and designing the visual appearance of the learning media within the Smart Apps Creator (SAC) platform.

The third stage is development, which involves refining the product design created in the previous phase. This stage includes media and material experts' validation to evaluate the feasibility of the Smart Apps Creator's learning media on the topic "My Region and Its Natural Resources." Following the validation process, revisions were made based on feedback and suggestions from the validators. The validation results were then assessed and calculated according to predetermined criteria.

Table 1. *Validation assessment criteria*

Presented (%)	Criterion
81-100	Very Feasible
76-85	Feasible Less Feasible Not Feasible
60-75	Very Unfit
55-59	
<54	

Source: Purwanto (2020)

The fourth stage is implementation. Once the validator has revised and validated the product, the next step is implementing the learning media in the classroom. The implementation took place in the fourth grade at SD Negeri Klumprit 04. The subsequent process began with administering a pretest to students before using the Smart Apps Creator (SAC) learning media. After collecting the pretest results, the researchers introduced the Smart Apps Creator (SAC) learning media during the learning process. Students took a post-test to gauge their content

comprehension after using the media. Upon completing this stage, the researchers distributed a questionnaire to teachers and students in the fourth grade at SD Negeri Klumprit 04 to assess the effectiveness of the Smart Apps Creator (SAC) learning media. The fifth stage is evaluation. In the final stage of the ADDIE development model, an evaluation is conducted to measure the feasibility and achievement of the media development objectives. This evaluation utilizes various instruments, including expert validation questionnaires, student and teacher response questionnaires, and an analysis of student learning outcomes on "My Region and Its Natural Resources" before and after using the Smart Apps Creator (SAC) learning media.

The effectiveness of using Smart Apps Creator (SAC) media was analyzed by comparing the pretest and post-test scores that students obtained. Data analysis was done using a normality test using the Shapiro-Wilk method through SPSS 23 software. In addition, the T-gain test is applied to assess the impact of independent variables on the dependent variable by comparing the differences in scores in two sample groups (Putri et al., 2023). The final stage of this study is the N-Gain test, which aims to determine the improvement of students' cognitive learning outcomes after using Smart Apps Creator (SAC) media (Syadida & Erita, 2022). This improvement was obtained by comparing students' pretest and post-test scores. The calculation of the N-Gain score can be expressed in the following formula:

$$\text{N-Gain} = \frac{\textit{posttest}\ \text{score} - \textit{pretest}\ \text{score}}{\text{maximum score} - \text{pretest score}}$$

Assessments are categorized according to the criteria listed below.

Table 2. *N-gain scoring criteria*

N-gain value	Category
$g > 0.7$	High
$0.3 \leq g \leq 0.7$	Low
$g < 0.3$	

Source: Sundayana (2018)

Results

Analysis

Based on the researcher's interviews with the fourth-grade teacher of SD Negeri Klumprit 04 regarding a problem experienced in learning activities, especially IPAS learning activities, the researchers found problems, including low daily test results in the IPAS learning content. In IPAS learning, teachers primarily depend on worksheets and continue to use the lecture method for explaining the material, which causes students to become bored. Additionally, teachers have not fully utilized information technology in schools due to their limited abilities, skills, and time.

Design

At this stage, the researchers set learning objectives, prepare materials, design learning tools, prepare evaluation instruments, and make storyboards containing the general design of

social science learning media. The text, images, colors, and material layout are tailored to suit students' needs and cognitive development stages. Designing interactive media requires careful and precise planning, as high-quality interactive media can effectively enhance students' learning motivation (Suri et al., 2022). The product developed in this study is a digital-based science and technology learning media made using the Smart Apps Creator (SAC) application.

Development

At this stage, the product is developed according to the pre-prepared plan. The learning material guides the development of the Smart Apps Creator (SAC) learning media, which incorporates voice dubbing from researchers and direct image capture. After the product is developed, the media will undergo a validation stage by material and media validators to assess its feasibility and suitability. The assessment carried out by the material validator includes certain aspects to ensure that the media developed is suitable for use. The assessment conducted by the material validator is as follows.

Table 3. *Results of media and material validator assessments*

Expert	Score	Total score	Presented	Criterion
Media	71	80	88%	Highly feasible
Material	67	80	83%	Highly Feasible

Table 3 presents the overall average results of validation. The learning media was declared in the category of "highly feasible" based on the results of validation from media experts, with a score percentage of 88%. Likewise, the validation results from material experts are also classified as "highly feasible" with a score percentage of 83%. The validators' assessment deems the Smart Apps Creator learning media highly feasible for educational use. The suggestions and inputs provided by the validators are used to improve the development of Smart Apps Creator media. The following Smart Apps Creator media design display has undergone a validation and revision process according to input from media and material expert lecturers, so it is ready to be implemented.

Figure 2. *Smart apps creator media homepage*

Figure 3. *Smart apps creator media usage guidelines*

Figure 4. *Materials related to my region and its natural resources*

Implementation

After the validation process conducted by media and material experts and the subsequent improvements to the Smart Apps Creator media, the next step is to test this learning media with 32 students in the fourth grade of SD Negeri Klumprit 04. The trial was carried out on two scales: small scale and large scale. In the small-scale trial, the sample used was six students. In this stage, the researchers carried out *pretests* and *post-tests* to assess the effectiveness of the media. They disseminated a response questionnaire to determine the feasibility of Smart Apps Creator. Furthermore, a large-scale trial was carried out involving 26 students. The following are the responses from 32 students and teachers to the use of Smart Apps Creator (SAC) media.

Table 5. *Results of student and teacher responses*

Responses	Total scores	Percentage (%)	Criterion
Small-scale responses	300	96%	Highly feasible
Large-scale response	1376	98%	Highly feasible
Teacher's response	49	94%	

Based on the questionnaire of students' responses to *the Smart Apps Creator media,* a percentage of 96% was obtained, and the score obtained from the teacher's response questionnaire was 49 out of a total score of 52, or equivalent to 94%. This indicates that *the Smart Apps Creator* media, which focuses on my regional material and its natural resources, is highly feasible.

Evaluation

At the evaluation stage, tests were carried out to assess the effectiveness of Smart Apps Creator media in learning IPAS. The researchers carried out a series of tests, including a normality test, a t-test (*paired sample test*), and an N-Gain test. The normality test was conducted using the Shapiro-Wilk method through the SPSS 23 application because the number of the fourth-grade students studied was 32, less than 50. In this test, the normality assessment criteria are that if the significance value is ≤ 0.05, then the data is said to be not normally distributed. In contrast, if the significance value is greater than 0.05, then the data is said to be normally distributed (Nasrum, 2018). In the small-scale trial, the pre-treatment values were 0.540 > 0.05, and after treatment, 0.443 > 0.05. Meanwhile, in the large-scale trial, the pre-treatment value was 0.069 > 0.05; after the treatment, it was also 0.069 > 0.05. Testing on small and large scales shows that all values obtained exceed 0.05. Therefore, it can be concluded that the data has a normal distribution and is suitable for t-testing. The t-test (paired sample test) is applied to analyze differences in learning outcomes before and after using learning media (Putri et al., 2023). The results of the t-test can be seen in Table 5 below.

Table 5. *T-test results (paired sample test)*

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. deviation	Std. Error mean	95% Confidence interval of the difference				
				lower	Upper			
Before and after treatment on a small scale	25.83333	7.35980	3.00463	- 33.55697	- 18.10970	-8.598	6	0.000
Before and after treatment at a large scale	- 30.00000	9.27362	1.81871	- 33.74570	- 26.25430	- 16.495	26	0.000

Source: SPSS data processing

Based on Table 5, the t-test conducted on a small scale showed a significant value (2-tailed) of 0.000 < 0.005. The same results were also found in the large-scale test, with a significant value (2-tailed) of 0.000 < 0.005. From the two test results, it can be concluded that H_0 is rejected and Ha is accepted. This indicates a difference in the average results before and after treatment, which shows that using Smart Apps Creator media improves the learning outcomes of the fourth-grade elementary school students. The last test conducted by the researchers was the N-Gain test, which aims to determine the average increase in learning outcomes of the fourth-grade students at SD Negeri Klumprit 04 in natural science learning. The results of the N-Gain test can be seen in Table 6.

Table 6. *N-gain test results*

	N	Minimum	Maximum	Mean	Std. Deviation
Small-scale n-gain	6	0.36	1.00	0.7069	0.21161
n-gain large scale	26	0.50	1.00	0.7007	0.13284

Source: SPSS data processing

Based on the results of the N-Gain test in the small-scale trial, there was an average increase of 0.7069, which was included in the high category. Meanwhile, in the large-scale trial, the average increase obtained was 0.7007, which is also classified as high.

Discussion

This research falls under the category of research and development (R&D). The product developed in this study is Smart Apps Creator (SAC) learning media. Learning media is important for creating a more interactive and practical learning environment (Azizah et al., 2022). Smart Apps Creator is an interactive digital media that presents IPAS material more visually and attractively to increase student involvement in learning.

In behavioristic learning theory, the relationship between stimuli and responses that occur through interaction with the environment is that learning occurs by providing the right stimulus so that students provide the expected response (Pramana, 2024). With Smart Apps Creator, this digital learning media provides stimuli through captivating text, images, sounds, and animations (Yulianti & Sudrajat, 2023). The responses given by students are in the form of understanding concepts, completing interactive tasks, and improving learning outcomes that can be observed through academic evaluation. In Smart Apps Creator-based media, students get direct feedback, for example, through animations or sounds that show correct or incorrect answers. This approach aligns with the concept of reinforcement in behavioristic theory, where positive reinforcement, such as scores or rewards, increases student motivation.

In contrast, negative reinforcement, such as repetition of exercises, encourages students to improve their understanding (Istiqomariyah et al., 2023). This study showed consistent results and was even higher compared to previous studies. The results prove that the research objectives have been met: the development of media design, feasibility, and effectiveness of Smart Apps Creator (SAC) learning media. Ferlianti et al. (2022) discussed the development of interactive learning multimedia SAC (*Smart Apps Creator*) on hydrostatic pressure materials. The research conducted is of the Research and Development (R&D) type, utilizing the ADDIE model. This research has several similarities with what has been done by the researcher, including the Smart Apps Creator media that was developed. At the same time, the

difference lies in the N-Gain result, which was 0.5 in the medium category, while the research conducted by the researchers produced an N-Gain of 0.7 in the high category.

Similar research was also conducted by Jaiz et al. (2022), who discussed the development of interactive multimedia based on Smart Apps Creator in thematic learning in elementary school. The study showed that media validation reached 88.34%, while material validation was 84.44%. These findings align with recent research, which shows a high feasibility level, thus encouraging further development of Smart Apps Creator (SAC) media. The main difference in this study lies in the material developed and the development model used, namely the Alessi and Trollip development models.

Based on the various literature reviews presented, although previous research has been conducted on developing Smart Apps Creator learning media, there are differences in the research subjects, variables studied, and analysis methods used. Therefore, this research is relevant to the problems found in the field. The problems identified include learning that is still dominated by lecture methods and the limitations of using work sheets, which impact the low learning outcomes of students in science and science subjects, especially in the material My Region and Its Natural Wealth. This condition encourages researchers to develop digital learning media that is more effective and aligned with learning objectives. Media Smart Apps Creator (SAC) is designed to provide an attractive stimulus for students to improve their learning outcomes. Technology in education allows the learning, teaching, and training processes in schools to be more effective (Nurhayatin et al., 2023).

Smart Apps Creator learning media has been proven to increase students' enthusiasm and activity, which can be a significant indicator in achieving optimal learning outcomes (Khasanah & Rusman, 2021). Interactive media is designed to help teachers deliver material with an attractive appearance that resembles a game and is equipped with image, audio, and video elements that suit learning needs. This approach makes it easier for students to understand the material and supports the development of their digital skills (Mills et al., 2023). Based on the research results, the development of Smart Apps Creator (SAC) learning media has proven effective in improving social science learning outcomes in the fourth grade of elementary school. This benefit can be seen from the increase in students' average pretest and post-test scores, from 56 to 86. In addition, the results of the N-Gain test showed an increase of 0.7007, which is included in the "High" category. Smart Apps Creator (SAC) media development using the ADDIE model has proven feasible, practical, and effective for learning science in the fourth-grade of SD Negeri Klumprit 04, particularly regarding the material of My Region and its Natural Resources.

Conclusion

Based on the research results, the development of Smart Apps Creator (SAC) learning media on My Region and Natural Resources using the ADDIE model is going well. The assessment from media experts showed a percentage score of 88% in the "highly feasible" category. In comparison, the assessment from material experts obtained a percentage score of 83%, which was also included in the "highly feasible" category. The results of the student response questionnaire in the small-scale trial reached 96%, while in the large-scale trial, it increased to 98%, both of which were included in the "highly feasible" category. In addition, the results of the N-Gain test showed a score of 0.7, which is classified as a high category, proving that using Smart Apps Creator (SAC) media can improve student learning outcomes.

The findings of this study indicate that the Smart Apps Creator (SAC) learning media has been successfully developed and proven to be feasible and effective in enhancing the learning outcomes of IPAS regarding My Region and Its Natural Resources for the fourth-grade students at SD Negeri Klumprit 04.

Disclosure statement

The authors declared no potential conflicts of interest.

Use of AI Statement

The authors declared that they had not used any AI tools in their manuscript preparation and submission.

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