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Literature Review: Potential and Challenges of Learning Using Smart Apps Creator (SAC) for Students

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Abstract
Students' critical thinking and literacy skills need to be improved because both are 21st century skills that are important for facing the challenges of changing times and technological developments, but currently, these abilities are not yet fit for purpose, so digital media is needed to support students' learning process. This research was conducted to determine the potential and challenges of implementing learning using Smart Apps Creator (SAC) for students. The research method used in this research is qualitative with a literature review approach. There were 15 articles selected for review that were published in 2019-2024. The article was obtained from Eric Journal and Google Scholar. The criteria for articles reviewed include being a research article, having a complete structure, open access, and using English and Indonesian. The results of this research reveal that the use of the Smart Apps Creator (SAC) application can improve students' scientific literacy skills and learning outcomes. Apart from that, this application can also develop students' interest and motivation to learn. SAC application development can also improve students' critical thinking and problem solving skills. Challenges faced in implementing SAC include teacher skills and preparation in developing SAC applications with other elements to make it more attractive and inadequate school facilities. Overall, Smart Apps Creator (SAC) can be a solution for teachers in using learning media so that student learning outcomes and literacy increase..
Keywords: *Literature review, Smart Apps Creator, Potential, Challenges*

Abstrak
Keterampilan berpikir kritis dan literasi peserta didik perlu ditingkatkan karena keduanya merupakan keterampilan abad 21 yang penting untuk menghadapi tantangan perubahan zaman dan perkembangan teknologi, namun saat ini kemampuan tersebut belum sesuai tujuan, sehingga media digital diperlukan untuk menunjang proses belajar peserta didik. Penelitian ini dilakukan bertujuan untuk mengetahui potensi dan tantangan implementasi pembelajaran menggunakan *Smart Apps Creator (SAC)* bagi peserta didik. Metode penelitian yang digunakan dalam penelitian ini adalah kualitatif dengan pendekatan *literatur review*. Artikel yang dipilih untuk ditinjau berjumlah 15 yang dipublikasikan pada tahun 2019-2024. Artikel tersebut diperoleh dari *Eric Journal* dan *Google Scholar*. Kriteria artikel yang ditinjau antara lain merupakan *research article*, memiliki struktur yang lengkap, *open access*, menggunakan bahasa Inggris dan Indonesia. Hasil penelitian ini mengungkapkan bahwa penggunaan aplikasi *Smart Apps Creator (SAC)* dapat meningkatkan kemampuan literasi sains dan hasil belajar peserta didik. Selain itu, aplikasi tersebut juga dapat mengembangkan minat dan motivasi belajar peserta didik. Pengembangan aplikasi SAC juga dapat meningkatkan keterampilan berpikir kritis dan *problem solving* peserta didik. Tantangan yang dihadapi dalam implementasi SAC antara lain keterampilan dan persiapan guru dalam mengembangkan aplikasi SAC dengan unsur lain agar lebih menarik dan fasilitas sekolah yang kurang memadai. Secara keseluruhan, *Smart Apps Creator (SAC)* dapat menjadi solusi untuk guru dalam menggunakan media pembelajaran sehingga hasil belajar dan literasi peserta didik meningkat.
Kata kunci: *Literature review, Smart Apps Creator, Potensi, Tantangan*

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INTRODUCTION

Literacy skills are a crucial aspect of global education, especially in preparing the 21st century generation to compete globally. However, PISA (Program for International Student Assessment) data shows that Indonesian students' literacy is still below international standards. Based on data from The Organization for Economic Co-operation and Development (OECD, 2023), Indonesian students' literacy score in PISA in 2022 is 388, placing them in 62nd place out of 81 countries. Although slightly higher than the scores in previous years, namely 383 in 2009, 382 in 2012, and 403 in 2015. This score shows that the scientific literacy of Indonesian students is still far from the international average (Hentian et al., 2022; Lendeon & Poluakan, 2022). This achievement shows that Indonesia is still at a low level of literacy measurement, which requires significant changes in learning approaches in Indonesia.

This decline in literacy scores reflects the low quality of learning taking place in Indonesia and shows that the education system in the country needs reform. Even though the Indonesian government has introduced the Independent Learning Curriculum policy which focuses on 21st century competencies as a solution to this challenge, its implementation is still faced with various obstacles. Azan and Ritonga (2021) stated that the Independent Learning Curriculum was designed to meet the needs of the 21st century generation, namely a generation that needs to be equipped with the competence to think, act and live according to current developments. Thinking competency includes critical thinking, creative thinking, and problem solving skills, while acting competency includes communication, collaboration, digital literacy, and technological literacy skills. Meanwhile, life competence includes initiative, independence, understanding of the world, and social responsibility (Indarta et al., 2021).

Even though the independent curriculum has great potential, its implementation is not free from challenges that still hinder the development of students' digital literacy and critical thinking. Improving critical thinking skills and digital literacy is a priority in achieving the competencies expected in the 21st century. This is because critical thinking not only develops the ability to analyze information in depth but also develops skills in solving complex problems (Varenina et al., 2021). However, the implementation of digital literacy in the Indonesian educational environment still faces various challenges, such as limited access to technology and differences in the ability to integrate technology into the learning process (Asari et al., 2019). The existence of application-based digital technology, such as Smart Apps Creator (SAC), has the potential to be a solution for improving students' literacy and critical thinking skills. SAC as an interactive learning media allows students to access various materials independently and deepen their understanding in a more flexible and accessible learning environment (Adn & Rahmadhani, 2022).

The SAC application has interactive features such as animations, images, videos, music, and other menus. This simple appearance can be easily accepted by students because the display presented is a combination of ebooks and PowerPoint. Apart from SAC being used as learning media, SAC can also be used to design simple applications, namely in the fields of tourism, city guides, marketing, and simple educational games (Faqih, 2021). The study shows that SAC is not only effective for science learning but can also be applied in other areas such as mathematics, language, and digital skills, adding to its relevance and flexibility in education.

SAC is a platform that allows users, especially teachers, to develop multimedia learning applications easily without requiring complex programming skills (Adn & Rahmadhani, 2022). The features contained in SAC, such as an interactive interface and the ability to save results in Android, iOS, EXE, and HTML formats, make it a flexible medium to be applied in learning (Ni'mah & Zutiasari, 2023). The advantage of SAC is

that it can be used without an internet connection, allowing students to access material repeatedly as needed, without any access barriers (Kuswanto et al., 2021).

Implementing application-based technology, such as Smart Apps Creator (SAC), in learning is not without challenges. This challenge arises both in terms of teachers' skills in using this technology and in terms of limited infrastructure in schools. Previous studies, such as those conducted by Gultom (2019), revealed that even though technology is increasingly developing and used by many parties, a large number of teachers still find it difficult to utilize technology for teaching and learning activities. These teachers need further training to be able to integrate digital applications more effectively in the learning process and to facilitate students in using this technology well. Good mastery of technology by teachers is very important to ensure that students can access and understand the material being taught optimally, especially when learning is carried out through application-based media such as SAC.

Limited school infrastructure, especially in remote areas, is also a significant obstacle to the effective implementation of SAC. Even though many schools in big cities have good internet access and adequate technological devices, in reality not all schools in Indonesia can access these facilities. In more isolated areas, the availability of computers, tablets, or even a stable internet network is often limited. In addition, even though the current generation of students, who are part of the digital generation, are generally accustomed to using technology in everyday life, they still need clear direction in utilizing this technology effectively in the learning context. Many students find it difficult to understand the material through applications without direct guidance from the teacher. These limitations show that although technology offers various potentials to improve the learning experience, the use of technology such as SAC still requires adequate guidance and assistance from educators. Based on this, it is important to further identify the potential and challenges faced in optimally implementing SAC.

METHODS

This study uses a descriptive analysis method for data obtained from a literature review. The literature review was conducted by focusing on original journals that include sections such as abstracts, introductions, methods, results, discussions, and conclusions. Journal searches were conducted through the Eric Journal and Google Scholar databases using keywords such as "Smart Apps Creator," "SAC in Education," "digital learning tools," and "educational technology challenges." This study focuses on the potential and challenges of using Smart Apps Creator (SAC) in learning. The journal criteria used in this study include:

1. Journals published in the 2019-2024 period;
2. Journals accessed through Eric Journal and Google Scholar;
3. Journals are open access so that they can be accessed by other researchers;
4. Journals in Indonesian and English;
5. Journals related to Smart Apps Creator (SAC).

The following diagram in Figure 1 explains the process of selecting articles for analysis.

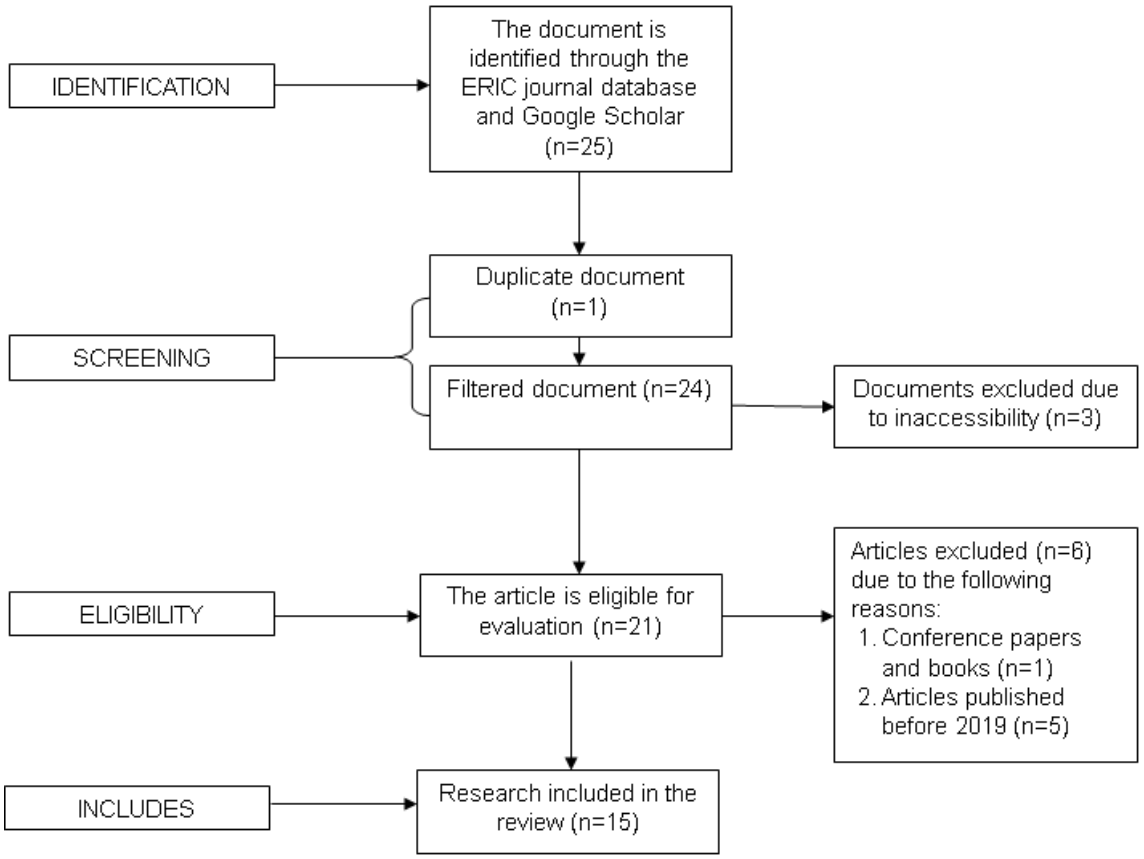

Figure 1. Article Review Flow Diagram

RESULT AND DISCUSSION

Result

After reviewing and analyzing the articles, relevant research results were obtained regarding the potential and challenges of Smart Apps Creator (SAC). Of the 25 articles used in this research, there are 15 articles related to the potential and challenges of implementing SAC. The substance of the 15 research articles is as follows.

Table 1. Results of the review of 15 articles

	Journal Title	Citation	Content/Result
1	Smart Apps Creator 3 Interactive Multimedia Based on Stream to Improve Students' Scientific Literacy During the Covid-19 Pandemic	(Heliawati et al., 2022)	The use of SAC with the STREAM model increases the scientific literacy of Madrasah Tsanawiyah students, supporting interactive and interesting learning during the pandemic.
2	The Effect of STREAM-Based Teaching Materials Using Smart Apps Creator 3 on Students' Scientific Literacy	(Pebriani et al., 2022)	STREAM-based media with SAC 3 increases students' scientific literacy through pretest-posttest. Visual/audio elements support engaging learning.
3	The effectiveness of the android-based budiran game assisted by smart apps creator 3 to improve science	(Sutrisni et al., 2022)	The SAC-based "Budiran" game improves fourth-grade students' science learning outcomes on the theme of sound and hearing with interesting interactions.

	learning outcomes of fourth graders in theme 1		
4	Increased Interest in Learning Through Smart Apps Creator	(Sagala & Simanungkalit, 2022)	SAC increases students' interest in learning through interesting and interactive teaching materials, as well as facilitating independent learning.
5	Improving The Motivation and Listening Ability of Eleventh Grade Students by Using Smart App Creator	(Susanti et al., 2023)	SAC increases the motivation and listening ability of class XI students with a variety of audio-visual elements, although it requires additional guidance.
6	Android-Based Mathematics Learning Media Assisted by Smart Apps Creator on Self-Regulated Learning Title	(Nasrullah et al., 2022)	SAC-based Mathematics Media supports independent learning by providing visual/audio elements that increase student interest.
7	Smart Apps Creator 3 to improve student learning outcomes during the pandemic of COVID-19	(Khoirudin et al., 2021)	SAC 3-based learning improves science learning outcomes by using more interesting audio-visual media during the pandemic.
8	The Development of Raya-In: Learning Media Based on Smart Apps Creator to Improve Primary School Social Science Learning	(Hidayah & Mulyani, 2024)	SAC-based Raya-In media is effective in increasing elementary students' understanding of science and science lessons through interactive elements that support material visualization.
9	The Effectiveness of Android-Based Physics Learning Media Assisted by Smart Apps Creator to Improve Learning Outcomes	(Watin et al., 2023)	The use of SAC-based physics media increases understanding of physics concepts and student learning outcomes in mechanical wave material.
10	Development of Smart Apps Creator Learning Media Using Problem-Solving Learning Models on Global Warming Materials to Improve Critical Thinking and Problem-Solving Ability	(Fahlevi & Aminatun, 2023)	Problem-solving-based SAC hones students' critical thinking skills and problem-solving abilities in global warming material.
11	Pengembangan Smart App Creator untuk Meningkatkan Literasi Peserta Didik pada Mata Pelajaran IPS di Sekolah Dasar	(Arif MS, 2023)	SAC is effective in increasing student literacy in elementary social studies lessons, followed by positive responses and increasing student grades.
12	Pengembangan Media Pembelajaran Smart Apps Creator Pada Pembelajaran IPAS Di Kelas V Sekolah Dasar	(Sari & Erita, 2024)	SAC-based media is very valid and practical to use to support science learning, increasing student understanding.
13	Pengembangan Media Pembelajaran Smart Apps Creator 3 Berbasis STEAM pada Muatan Matematika Sekolah Dasar	(Sirait et al., 2024)	STEAM-based SAC helps overcome challenges in mathematics learning, increasing student engagement and understanding.
14	Pengembangan Media Game Edukasi Berbasis SAC (Smart Apps Creator) pada Materi Pancasila sebagai Nilai Kehidupan	(Amelia & Iklimatuzzahra, 2024)	SAC-based educational games are effective for teaching the values of Pancasila to class IV students with an interesting approach.

15	Hubungan Penggunaan Media Pembelajaran *Smart Apps Creator* dengan Hasil Belajar Siswa Kelas II A Tema 7 Subtema 3 Pembelajaran 4 SDN 105297 Helvetia T.A. 2022/2023	(Rumapea, 2024)	The use of SAC is positively related to increasing student learning outcomes in learning Theme 7 Subtheme 3 in class II A.

Discussion

In the 21st century, critical thinking and literacy skills have become essential competencies that students must have to face the challenges of changing times and dynamic technological developments (Varenina et al., 2021). However, although important, students' critical thinking skills and scientific literacy in general still do not meet expectations, which indicates the need to develop learning methods that can foster these skills effectively. One method that shows great potential in improving the quality of education is the use of technology-based learning applications, such as Smart Apps Creator (SAC).

Along with rapid technological advances, education is experiencing a transformation that not only includes learning materials but also the methods and tools used in the teaching and learning process (Sagala & Simanungkalit, 2022). Based on the results of analysis from 15 article sources, four main themes emerged related to the use of Smart Apps Creator (SAC) in learning, including: 1) Increasing Literacy and Learning Outcomes through the Use of SAC; 2) Increased Student Interest and Learning Motivation; 3) Improving Critical Thinking and Problem Solving Skills: and 4) Challenges of SAC Implementation in Elementary Schools. These four themes were discovered through an in-depth analysis of research results which explained the positive influence of using SAC on literacy, learning motivation, critical thinking skills, and the challenges faced in its implementation.

1. Improving Literacy and Learning Outcomes through the Use of SAC

The use of SAC in learning has been proven to have a positive impact on increasing students' scientific literacy. Based on the research results of Pebriani et al. (2022) and Heliawati et al. (2022), the use of SAC in the STREAM learning model has been able to improve students' scientific literacy results significantly, as reflected in the pretest and posttest results which show an increase in students' understanding of scientific concepts. The interactive and visual features of SAC allow students to not only receive information passively but also play an active role in exploring scientific concepts (Sari & Erita, 2024). This finding is in line with Jean Piaget's constructivist theory, which states that learning is an active process in which students build understanding through direct interaction with the learning environment (Marinda, 2020). Thus, SAC supports students to become active agents in building their knowledge, especially on abstract concepts that are difficult to understand through conventional learning methods.

Sutrisni et al. (2022) revealed that SAC is not only effective in science learning, but can also be applied in other subjects, such as mathematics and language, so the flexibility of SAC as a technology-based learning medium can support various scientific disciplines (Amelia & Iklimatuzzahra, 2024). This increase in students' scientific literacy is not only the result of absorbing information visually and interactively but is also caused by SAC's ability to contextualize science material in everyday life that is relevant for students (Khoirudin et al., 2021). When linked to Vygotsky's scaffolding theory, the role of SAC in learning can be understood as a form of "temporary support" provided to students in the early stages of learning (Agfirlana & Makmuri, 2023).

In Vygotsky's theory, scaffolding includes various forms of assistance provided by teachers or learning resources, such as instructions, encouragement, and decomposing

problems into simpler forms, so that students can develop their abilities independently in the Zone of Proximal Development (ZPD). SAC functions as a learning aid that allows students to learn independently and interactively, but still receive guidance through application features designed to provide feedback, explanations, and relevant visual examples. This supports students in developing critical thinking and problem solving skills, where they can ultimately take full responsibility for their learning once they become accustomed to using the application.

2. **Increasing Students' Interest and Motivation to Learn**

Apart from helping increase scientific literacy, the use of SAC also plays an important role in increasing students' interest and motivation to learn. The study conducted by Susanti et al. (2023) shows that students who learn using SAC feel more motivated in English subjects. This is due to the visual displays, animations, and interactive features on SAC which offer a different learning experience compared to traditional methods. Students feel interested in learning because of the visual displays, animations, and interactive features of SAC which can attract their attention and make the learning process more enjoyable.

Dollard and Miller explained that this increase in learning motivation can be explained through four main components of learning, namely drive, cue, response, and reinforcement (Suwarno, 1992). In the SAC context, drive (internal stimulation) arises from the student's desire to understand the material better. Cue (external stimulation) is realized in the form of visual and interactive stimulation from the SAC feature, which attracts students' attention to the learning material. Student responses can be seen from their activeness in using these features, such as answering quizzes or completing learning simulations. Meanwhile, reinforcement is given through visual rewards, positive feedback, or a sense of achievement that students feel after successfully understanding the material.

Hidayah & Mulyani (2024) also found that interactive media such as SAC can create a more conducive learning atmosphere. By using SAC, students learn in a comfortable and enjoyable atmosphere, so they are more focused and motivated to continue exploring the material. This research is in line with the findings of Nasrullah et al. (2022) and Khoirudin et al. (2021), which state that a positive learning environment can reduce student boredom and encourage them to be more active in the learning process. Thus, SAC not only functions as a learning aid but also as a medium that helps create a more meaningful and meaningful learning experience fun for students.

3. Improving Critical Thinking and Problem Solving Skills

The use of SAC has been proven to have a positive impact on improving students' critical thinking and problem solving skills. Fahlevi and Aminatun (2023) explained that when SAC is applied in a problem-solving-based learning model, this application encourages students to use their critical thinking skills more intensively. This ability allows students not only to receive information passively, but also to analyze, evaluate, and draw conclusions based on a deep understanding of the learning material (Ennis, 1996).

These findings are also relevant to the theory expressed by Facione (1990) which states that critical thinking involves the process of identifying important elements in formulating hypotheses, evaluating data, and drawing conclusions. Through the application of SAC, students are invited to answer reflective questions, explore alternative solutions, and connect learning concepts with real situations. Students can utilize the interactive features and simulation scenarios provided by SAC to understand concepts in more depth and apply them in contextual situations.

Cottrell (2005) also states that critical thinking is part of cognitive activity which includes effective decision making and systematic problem solving. Through features such as simulations and learning scenarios in SAC, students can make decisions based

on information displayed visually, either in the form of graphs, animations, or interactive data. This is reinforced by Santrock (2009), who emphasizes that cognitive activities aim to help students understand the concepts learned and apply them to solve problems in various new situations outside the school environment.

Research conducted by Nasrullah et al. (2022) also shows that the use of SAC-based learning media is also able to support student learning independence. When students are encouraged to learn independently and explore material with the help of technology, they not only become more independent but also develop the ability to solve problems effectively (Sa'adah et al., 2020). This shows that SAC not only functions as a learning medium but is also an effective tool for developing high-level cognitive abilities. SAC's interactive features help students think systematically, evaluate various alternative solutions, and draw conclusions based on relevant data. These results show the important role of educational technology in improving students' critical thinking skills, which are essential for facing challenges in the context of modern life.

4. Challenges of SAC Implementation in Elementary Schools

There are also several challenges faced in its implementation in the educational environment. One of the main challenges is the skills and readiness of teachers in developing interesting and effective SAC applications for learning. Not all teachers have the skills or feel comfortable using technology in the learning process, especially those who are not used to using digital applications as learning media (Gultom, 2019). This is an obstacle to the optimal implementation of SAC because the effectiveness of using this application is highly dependent on the teacher's ability to design and present learning materials interactively and attractively. The reviewed articles indicate that many teachers feel the need for additional training in the use of this technology to maximize the potential of SAC in learning. In addition, the lack of adequate technological facilities in schools, especially in remote areas, is also a significant challenge.

As expressed by Sirait et al. (2024) and Watin et al. (2023), inadequate infrastructure, such as limited internet access and hardware needed to run SAC applications, are major obstacles to implementing this technology in schools. Without adequate facility support, it is difficult for schools to integrate this technology into teaching and learning activities effectively and sustainably.

Overall, the use of Smart Apps Creator (SAC) has great potential to improve the quality of education by increasing students' scientific literacy, learning motivation, and critical thinking and problem-solving skills. By utilizing this technology, teachers can create more interactive, engaging, and relevant learning experiences for students, thereby increasing the effectiveness of learning. However, to optimize the benefits of SAC, comprehensive steps are needed to overcome existing challenges, such as teacher training, improving technological facilities in schools, and developing content that actively involves students. Through these efforts, SAC has the potential to become one of the innovative solutions in supporting 21st century learning that is of higher quality and competitive at the global level. By presenting technology-based learning innovations such as SAC, education in Indonesia is expected to continue to advance and be able to compete in this increasingly competitive era of globalization.

CONCLUSION

Smart Apps Creator (SAC) has great potential to improve the quality of education, especially in science literacy, learning motivation, and critical thinking and problem-solving skills. SAC's interactive features help students become more actively involved and understand complex concepts in depth. In addition to supporting problem-solving-based learning, the use of SAC also creates an interesting learning atmosphere and motivates students to participate more actively. However, the implementation of SAC faces challenges in the form of teacher skills and limited infrastructure in certain schools.

Therefore, comprehensive training is needed for teachers to improve their skills in using SAC and their confidence in implementing technology as a learning medium. Improving technological facilities in schools also needs to be prioritized, especially in areas that still have limited access. Involving students in the development of SAC content can also create a more personal and relevant learning experience. Thus, optimizing the use of SAC in learning has the potential to strengthen the quality of education in Indonesia, while making it more relevant to the demands of the 21st century.

The application of Smart Apps Creator (SAC) in education has important implications for the quality of 21st century learning in Indonesia. With technology that supports a more interactive and independent learning process, students not only develop literacy and critical thinking skills but also other skills that are relevant to the demands of the world of work in the future, such as creativity and problem solving. In addition, the use of SAC can accelerate digital transformation in education in Indonesia, which is important in responding to the challenges of globalization and ever-changing technological developments.

Based on the findings of this research, there are several recommendations for further development so that the use of SAC in learning can be optimized.

1. Training for Teachers.

   Training in the use and development of SAC content is essential to improving teacher skills. Comprehensive training will help teachers design interactive learning materials and build confidence in using technology as a teaching tool. Apart from that, this training will also make it easier for teachers to understand how the SAC application works and optimize its features to create more interesting learning.
2. Improved Technological Facilities.

   Improving technological facilities in schools needs to be a priority so that the use of SAC can be implemented evenly. Governments and stakeholders must work together to provide better access to the Internet, computers, and other devices. This will enable schools, especially those in remote areas, to access the technology needed for learning.
3. Developing Content that Involves Students.

   Through student involvement, they not only become participants in learning but can also contribute to creating a more personalized and relevant learning experience. This approach can increase students' sense of ownership of the material being studied and strengthen their involvement in the learning process.

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