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Development of Smart Apps Creator-Based Learning Media for the Human Auditory System Topic in IPAS Subject for Grade V at SDN 14 Ampenan

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ABSTRACT

Learning media play a crucial role in the success of the educational process. Without appropriate media, learning tends to become monotonous, relying solely on the teacher and lacking variety in resources. The integration of media significantly influences students' cognitive development. Observations and questionnaire distribution revealed learning challenges, where teachers predominantly used LKS (student worksheets), resulting in low student achievement in the topic of the human auditory system. Conversely, the potential analysis showed that all students owned smartphones. This research aimed to develop a valid and practical learning medium on the topic of the human auditory system using Smart Apps Creator. This study employed a Research and Development (R&D) design using the Sugiyono model to evaluate the feasibility and practicality of the developed media. The study was conducted at SDN 14 Ampenan, involving 19 fifth-grade students. Instruments included validation questionnaires for material experts and media experts, as well as practicality questionnaires for student and teacher responses. The results showed: (1) material expert validation yielded a score of 83.3%, indicating a "very valid" qualification; (2) media expert validation reached 76.6%, indicating a "valid" qualification; (3) product trials by teachers and students resulted in scores of 87.64% and 87.5% respectively, classified as "very practical"; and (4) implementation trials scored 93.05% (teacher) and 95.2% (student), also categorised as "very practical." Based on these findings, the Smart Apps Creator-based learning media is considered feasible and effective for use in the classroom. The media is designed to be interactive, enabling students to actively engage in the learning process through features such as simulations, quizzes, and real-time feedback, thereby enhancing their understanding of the material.

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1. INTRODUCTION

The quality of learning is significantly influenced by the teacher's ability to design engaging instruction and utilise appropriate learning media [1]. However, the availability and integration of learning media in Indonesian elementary schools remain limited, particularly for ICT-based media [2]. This lack of media utilisation negatively affects the teaching and learning process, leading to monotonous, teacher-centred instruction that underutilises available resources [3]. Consequently, it also impacts students' cognitive development, particularly in science education.

Learning media play a crucial role in enhancing students' conceptual understanding [4]. According to Auliya [5], the use of science learning media in Grade V significantly improved students' comprehension, increasing their understanding from 43% to 72%. This emphasises the vital role of media in optimising the learning experience [6]. Therefore, the selection of media must consider the complexity and characteristics of the learning material, as well as the alignment with technological advancements, especially in science topics such as the human auditory system [7].

Interviews conducted with Grade V homeroom teachers at SDN 14 Ampenan revealed challenges in teaching the auditory system. Teachers still relied on conventional worksheets and PowerPoint presentations, which were perceived as less effective. Although teachers expressed the desire to develop interactive application-based media, they were hindered by limited time and technical knowledge. Further, a diagnostic questionnaire administered to 25 students on the human auditory system showed that 14 students scored between 40 and 70, and only 5 students scored above the minimum passing grade of 80.

In response to these issues, innovation in developing interactive and practical learning media is essential. One promising solution is the use of Smart Apps Creator, a platform that enables the development of Android-based educational media without requiring coding skills [8]. Previous research by Uliyandari and Sutarno [9] demonstrated the effectiveness of Smart Apps Creator-based educational games in improving student outcomes on magnetism topics, with an achievement level of 90.93%. The app is compatible with Android devices and laptops, supports various multimedia formats, and is particularly suitable for students who are already familiar with smartphones [10].

The development of Smart Apps Creator-based media is considered appropriate for delivering auditory system content in a way that aligns with student characteristics. The lack of engaging media has led to low learning motivation and poor visualisation of the hearing organs and their functions. This media aims to provide a 3D visualisation of the ear, designed in a game-like format, supplemented with materials on hearing impairments and a glossary feature to enhance student understanding.

This study focuses on developing Smart Apps Creator-based media to improve Grade V students' comprehension of the human auditory system. Unlike previous studies, this development includes a 3D representation of ear anatomy in a gamified structure, integrated with supplementary material and a glossary as a solution to issues in student interest and content visualisation.

This research seeks to answer two main questions concerning the development and implementation of Smart Apps Creator-based media for the human auditory system in the IPAS subject for Grade V at SDN 14 Ampenan. The objectives are to describe the systematic development stages of the interactive learning media and to assess its validity and practicality based on evaluations from subject matter experts, media experts, and responses from teachers and students as end users. The findings are expected to provide a comprehensive understanding of the development process and demonstrate the feasibility of using Smart Apps Creator-based media as an innovative alternative in science education.

2. METHOD

This research was conducted at SDN 14 Ampenan during the 2024/2025 academic year. The subjects of this study were fifth and sixth-grade students at SDN 14 Ampenan. The research employed a Research and Development (R&D) methodology using the Sugiyono development model [11], which consists of ten systematic and structured stages. These stages include: (1) potential and problem identification, (2) data collection, (3) product design, (4) design validation, (5) design revision, (6) product trials, (7) product revision, (8) product implementation (trial use), (9) final revision, and (10) mass production. This model was chosen due to its suitability for the systematic development of valid and practical learning media [12]. The product development process involved multiple testing phases, including expert validation by material and media specialists, and classroom trials using instructional materials on the human auditory system.

In the first stage, the researcher conducted observations and interviews at SDN 14 Ampenan to identify existing potential and problems. These included the availability of smartphones among students, internet access, technological infrastructure, the limited use of digital media in classrooms, teachers' instructional approaches, and students' comprehension of the human auditory system. These findings were used to design an interactive multimedia learning tool for the IPAS subject, specifically focusing on the auditory system.

The second stage involved both qualitative and quantitative data collection. Qualitative data were gathered through interviews with Grade V teachers and students regarding the current use of learning media. Quantitative data were collected through a smartphone ownership questionnaire, teacher and student practicality response questionnaires, and a ten-item test to assess students' understanding of the auditory system.

In the third stage, the product design phase, the researcher developed the learning media through several sub-processes:

a. Material Collection: Learning materials on the human auditory system were compiled from worksheets, e-books, and scientific literature, adapted to the learning outcomes and characteristics of Grade V students. Visual elements such as backgrounds, icons, and navigation buttons were designed using Canva, while 2D and 3D images were sourced from Pinterest and Sketchfab. Audio and background music were obtained from YouTube with attention to copyright compliance.
b. Flowchart Development: A flowchart was created to establish the structural framework of the learning material, visualise the sequence of learning activities, and guide media development.

c. Storyboard Creation: The storyboard functioned as a narrative and visual plan to sketch and organise the content before actual development. It included elements such as navigation, visual tools, images, and audio that would be implemented in the Smart Apps Creator platform.

The fourth stage of design validation. The validation stage involved 4 expert validators from the University of Mataram: 2 media experts (assessing appearance and language) and 2 material experts (assessing the content of the material on Smart Apps Creator-based media). A validity test was conducted using a questionnaire containing aspects and assessment indicators using the Guttman scale.

After experts have validated the design, the shortcomings of the product will be known. These shortcomings were then corrected in the fifth stage, namely, product revision. The purpose of this revision is for researchers to produce even better products. After the product is revised, it is continued with the sixth stage, namely the product trial. The product trial in this study will be carried out on 20 students in grade VI and 2 teachers before being tested in class V, using the Inquiry Learning approach with assessment indicators using the Likert scale. The goal is to determine the feasibility of the media developed for trial use.

The seventh stage is product revision. The product revision stage is carried out by looking at input and suggestions from students and teachers. Revisions or improvements are carried out to improve the learning media developed. After the revision, the Smart Apps Creator media was tested on 25 students and 2 teachers of grade V of SDN 14 Ampenan using the Inquiry Learning approach with steps similar to the previous product trial. After conducting a trial use, it was found that some shortcomings and weaknesses would be revised in the ninth stage, namely, the revision of the product. Product revisions are carried out by looking at input and suggestions from students and teachers at the trial stage of use. The revision was carried out to improve the learning media developed until it became the final product. After going through design, trial, and revision, Smart Apps Creator learning media was created that is valid and practical, so it is suitable for use in learning. The development of this media is expected to be a solution to the problems of teachers and students of grade V at SDN 14 Ampenan.

3. RESULTS AND DISCUSSION

3.1. Results

The first stage of this research is the potential and problem. Based on the results of the distribution of questionnaires and observations that have been carried out, the results of the potential analysis show that all students in grades V and VI have *smartphones*, and the availability of facilities in the field of technology at SDN 14 Ampenan. However, the problem analysis revealed the lack of use of technology-based learning media by teachers, who tend to use LKS and lecture methods. The development of Smart Apps Creator-based media is a solution to the problem of low student learning outcomes and the lack of use of technology-based media by teachers. The designed media will present the material more interestingly and interactively, which is expected to improve students' understanding and learning outcomes. In addition, by considering the ease of use for teachers and taking

advantage of the potential availability of students' *smartphones* and school technology facilities, this media has great potential to be implemented effectively in teaching and learning activities at SDN 14 Ampenan.

The second stage is data collection in this development research, involving a review of the literature and previous research to identify the relevance and advantages of existing Smart Apps Creator-based media. The goal is to support the design of the media to be developed, as reflected in the empirical analysis of the use of similar media in the classroom.

Table 1. Previous Research Results on the Use of Smart Apps Creator-Based Learning Media

No	Title	Author	Year	Results
1	Pengembangan Media Pembelajaran Interaktif Berbasis Android *Smart Apps Creator* (SAC) pada Pembelajaran IPAS di SDN Kawahmanuk	Novera Nursalimah and Atang Sutisna	2024	Smart Apps *Creator-based media* is suitable for use in IPAS learning and learners' learning outcomes before and after the implementation of *Smart Apps Creator* (SAC) media, resulting in a significance value of 0.000, which is less than the threshold of 0.05.
2	Pengembangan Multimedia Interaktif Berbasis *Smart Application Creator* (SAC) pada Pembelajaran IPAS di Kelas IV SDN 13 Pasaman Kabupaten Pasaman Barat	Wikimalzis and Suardi	2024	The use of interactive multimedia based on *Smart Application Creator* in science learning in elementary schools for grade IV has been proven to be a valid, practical, and effective learning medium to improve student learning outcomes.
3	Pengembangan Media Pembelajaran Interaktif Berbasis *Smart Apps Creator* (SAC) Materi Perubahan Bentuk Energi pada Peserta didik Kelas IV SDN Kuwik 2	Mahavera Nila Wardani, Muhamad Basori.	2024	Interactive media based on *Smart Apps Creator* (SAC) is very good to use as a learning medium. For the practicality test, it received 98% of the teacher's response and 95.5% of the students ' response students so that they obtained an average of 96.7% in the category of very practical. By using *Smart Apps Creator* as a learning medium, students are more focused and motivated in learning.

The third stage is product design in the form of an application based on Smart Apps Creator. The design process includes the collection of materials and designs. At this stage, the researcher collected material related to the auditory organ system in humans sourced from LKS, literature reviews, and e-books. Meanwhile, the collection of design materials consists of images, audio, videos, animations, and navigation buttons sourced from Canva, Sketchfab, Pinterest, Google, and YouTube. After collecting the material, the researchers created a flowchart and a storyboard. Flowcharts aim to simplify the learning process, provide guidance, and make it easier to navigate the content [13]. Storyboards play an important role as a planning tool, visualising the display and integrating interactive elements [13].

The fourth stage is design validation. The validation of the Smart Apps Creator-based media development design was tested by 2 experts, namely material experts and media

experts. The purpose of the design validation is to test the validity of the media that has been developed so that it is valid to be tested for students in grade V of SDN 14 Ampenan.

Table 2. Results of Material Expert Validation Per Aspect

No	Assessment Aspects	Result Score	Maximum Score	Percentage	Criteria
1	Content	9	10	90%	Very valid
2	Language	2	4	50 %	Quite valid
3	Presentation	9	10	90%	Very valid
	Total	20	24	83,3%	Very valid

Table 3. Validation Results of Media Experts by Aspect

No	Assessment Aspects	Result Score	Maximum Score	Percentage	Criteria
1	Interactive Multimedia Components	8	10	80%	Very valid
2	Display Organisation	4	8	50%	Quite valid
3	Interactivity	4	4	100%	Very valid
4	Overall Rating	7	8	87,5%	Very valid
	Jumlah	23	30	76,66%	Valid

In table 2, it can be seen that the results of the validity of the material were obtained with a result score of 20 out of a maximum score of 24 with a percentage of 83.3% with a very valid category and table 3 of the results of media validity obtained a result score of 23 out of a maximum score of 30 with a percentage of 76.66% with a valid category. So it can be concluded that the media developed based on *Smart Apps Creator* is feasible to use.

After validation, weaknesses in the application developed were found and then corrected in the fifth stage, namely, product revision. After the design revision was carried out, the sixth stage was then carried out, namely product testing on grade VI students of SDN 26 Ampenan, before being tested for grade V. The trial involved all grade VI students, totalling 21 people and 2 teachers. The trial in the classroom uses *the inquiry learning model.* After the trial was carried out, it continued to the seventh stage, namely product revision. The purpose of this stage is to improve the development of media based on suggestions and input from teachers and students before conducting a trial in the eighth stage, namely the trial of use. The trial involved 19 students in class V and 2 teachers using the same learning model as the previous trial.

Based on the results of product trials and use trials, the responses of students and teachers were found. In the product trial, the results of the students' response obtained a score of 87.64%, rising to 95.2% in the very practical category. Meanwhile, the teacher's response received a score of 87.5%, rising to 93.05% in the practical category. It can be concluded that Smart Apps Creator-based media *is* very practical to use. This indicates that students are more interested and enthusiastic about participating in learning with Smart Apps Creator-based media, and teachers are also helped in delivering the material taught. The graph of the results of the percentage of responses of students and teachers in the product trial and use trial is described in Figure 2.

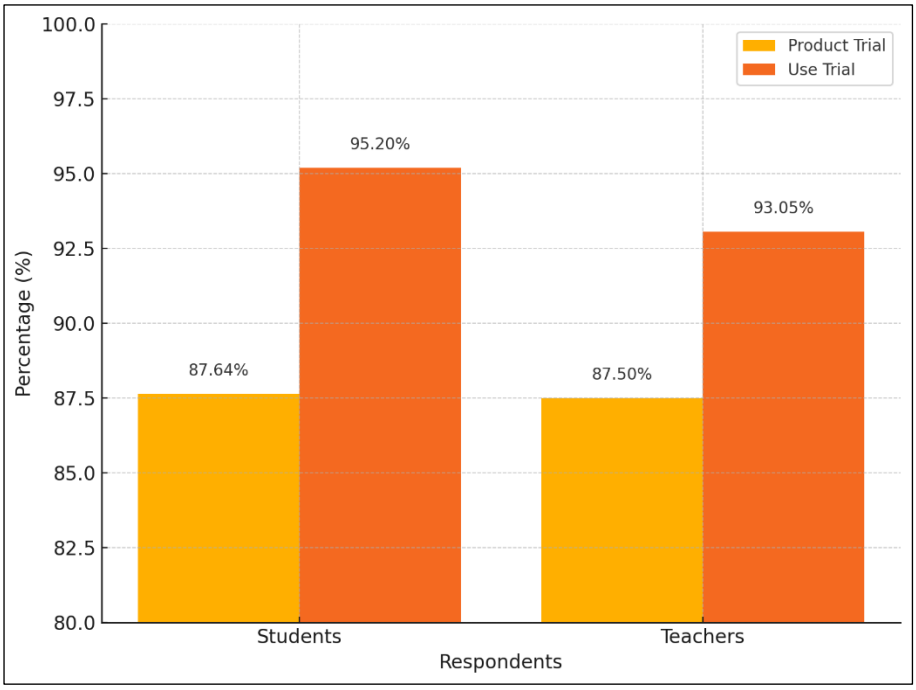

Figure 2. Student and Teacher Response Scores in Product and Use Trials

The final stage of the development research developed by Sugiyono is the final product. At this stage, the development product has become the final product, which is ready to be used. In this study, the product developed is an application of organ material in the auditory system in humans, as seen in Figure 1.

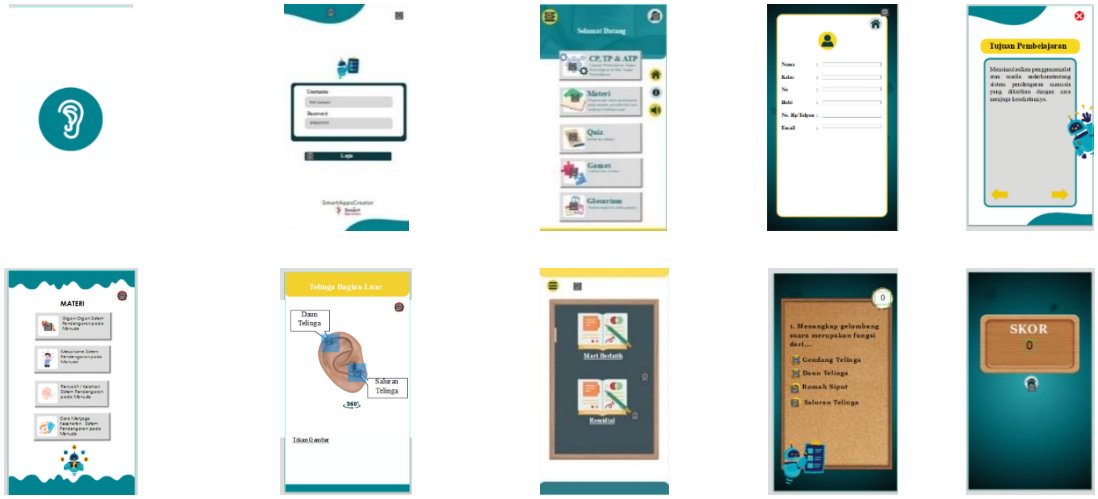

Figure 1. Smart Apps Creator Product Design

3.2. Discussion

The outcome of this development research is a Smart Apps Creator-based application designed to support IPAS (Integrated Science and Social Studies) learning on the topic of the human auditory system for Grade V students at SDN 14 Ampenan. The development process followed the Sugiyono R&D model, which began with an analysis of potential and problems. It was found that students in Grades V and VI possessed smartphones and had

access to adequate technological infrastructure. However, teachers were still underutilising technology-based learning media, relying instead on conventional worksheets and lectures. This lack of media use led to monotonous learning experiences and low student achievement. These findings align with the study by Nursalimah & Atang, which highlighted students' low engagement with book-based science learning [14].

Learning science, especially abstract concepts such as the auditory system, requires concrete and visual media to minimise misconceptions and enhance comprehension. This is supported by Anggraini [15], who emphasised that the use of concrete media increases interactivity, provides direct experience, and enhances meaningful learning for students. Responding to the problems identified, this study proposed the development of Smart Apps Creator-based media tailored to the characteristics of elementary students. This approach is consistent with Hasana's findings, which demonstrated the effectiveness of Smart Apps Creator in improving student learning outcomes [16].

During the data collection phase, qualitative and quantitative findings confirmed that the integration of Smart Apps Creator is relevant, effective, and efficient for learning. Prior studies support the idea that media, when aligned with students' needs and learning goals, can serve as an effective alternative for classroom instruction [17].

The product design stage involved structured development, including the collection of scientific content, illustrations, audio elements, and animations. The design was guided by flowcharts and storyboards, ensuring clarity, visual appeal, and user-friendly navigation. Hajar et al. [18] suggest that high-quality multimedia learning applications should meet criteria such as easy navigation, coherent content, aesthetic appeal, media integration, and alignment with learning objectives. Additionally, interactive applications must be developed in well-defined stages to prevent user confusion [19]. The Smart Apps Creator-based application met these standards by providing clear navigation instructions, validated content, engaging visuals, audio-visual elements, and well-integrated interactive components, such as simulations and quizzes related to auditory learning [20].

The design validation phase involved media and content experts from the University of Mataram. A learning medium is considered valid in terms of content if it presents accurate, relevant, and up-to-date information aligned with curriculum goals and learner characteristics [21]. Media validity, on the other hand, is evaluated based on visual and interactive quality, technical functionality, and its ability to deliver the material [21] effectively. Validation scores from both sets of experts indicated that the media met "very valid" criteria, affirming its suitability for use in elementary education.

The next stage is product trials. The product trial was carried out twice with *the inquiry learning model,* which consisted of 6 stages, namely the orientation stage, the problem formulation stage, the hypothesis formulation stage, the data collection stage, the hypothesis testing stage, and the conclusion formulation stage. The learning process, *inquiry learning* aims to improve the ability to think critically, invites to explore knowledge by asking questions, seeking information, and analysing and testing hypotheses [22]. In the product trial, the application developed provides relevant sources of information (images, videos, simulations) for students' inquiry, facilitates research and data collection when formulating hypotheses, as well as the existence of analysis features in the form of quiz

features or interactive assignments that provide direct feedback to students, helping them monitor their understanding during the inquiry process [23]. Based on the results of product trials and trials of the use of teachers and students, an increase in the result score was obtained with very practical criteria. This is in line with research conducted by Mahavera & Basori (2024), by using *Smart Apps Creator* as a learning medium, students are more focused and motivated in following the teaching and learning process. So, from the results of product trials by students and teachers, it can be concluded that the media received a positive response and was very suitable for use in elementary schools [24].

Following the implementation trial, feedback was collected from students and teachers. As no major revisions were suggested, the development proceeded to the final stage. The final product, as defined in the Sugiyono model, represents a ready-to-use learning application that integrates auditory system materials using interactive, visual, and student-centred design [25]. This final application serves as a practical and innovative solution to the challenges previously encountered in teaching science concepts to Grade V students at SDN 14 Ampenan.

4. CONCLUSION

Based on the results of the research and the findings discussed in the previous section—particularly the feasibility assessments conducted by subject matter experts, media experts, teachers, and students—it can be concluded that this development successfully produced a Smart Apps Creator-based learning media application for the IPAS subject, specifically focused on the human auditory system.

The application features various interactive content, including the anatomy and function of ear organs, the hearing mechanism, common ear disorders, and tips on maintaining ear health. One of its key advantages lies in its accessibility: students can engage with the material anytime and anywhere, repeat lessons at their own pace, and accelerate their learning process.

Expert evaluations support the validity of the application. Material experts rated the media at 83.3%, indicating a “very valid” category, while media experts gave a score of 76.66%, placing it in the “valid” category. In terms of practicality, teacher responses during product trials yielded a score of 87.5%, and 93.05% during the implementation trial, both categorised as “very practical.” Similarly, student responses were highly positive, with 87.64% during product trials and 95.2% during the use trial, also falling into the “very practical” category.

This research is expected to yield benefits for multiple stakeholders. For students, the application serves as an engaging and flexible learning resource to understand the human auditory system within the IPAS curriculum. For teachers, it offers an innovative alternative medium that supports inquiry-based learning and fosters students’ critical thinking skills. For future researchers, the study may serve as a reference or foundation for the continued development of Smart Apps Creator-based educational media on similar or related scientific topics.

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REFERENCE

[1] N. D. Lestari, R. Hermawan, and D. Heryanto, "Pengembangan Media Pembelajaran Menggunakan Powtoon Untuk Pembelajaran Tematik Sekolah Dasar," *Jurnal Pendidikan Guru Sekolah Dasar*, vol. III, no. III, pp. 33–43, 2018.

[2] Isnarto, Abdurrahman, and Sugianto, "Pengembangan Laboratorium Media Pembelajaran Berbasis Kebutuhan Sekolah," *Jurnal Profesi Keguruan*, vol. 3, no. 2, 2017.

[3] Ani Daniyati, Ismy Bulqis Saputri, Ricken Wijaya, Siti Aqila Septiyani, and Usep Setiawan, "Konsep Dasar Media Pembelajaran," *Journal of Student Research*, vol. 1, no. 1, pp. 282–294, Jan. 2023, doi: 10.55606/jsr.v1i1.993.

[4] A. D. P. Ansara, R. Okra, L. Efriyanti, and H. A. Musril, "Perancangan Media Pembelajaran Sejarah Kebudayaan Islam berbasis Android Menggunakan Software Smart App Creator (SAC)," *Intellect: Indonesian Journal of Learning and Technological Innovation*, vol. 2, no. 1, pp. 60–76, 2023.

[5] F. N. Auliya, "Pengaruh Penggunaan Media Pembelajaran Terhadap Hasil Belajar IPA Pada Siswa Kelas IV MIM Klaseman Tahun Ajaran 2022/2023," UIN Surakarta, Surakarta, 2023.

[6] Sapriyah, "Media pembelajaran dalam proses belajar mengajar," in *Prosiding Seminar Nasional Pendidikan FKIP*, Serang: Untirta, 2019, pp. 470–477.

[7] D. Nurani, L. Anggraini, K. R. M. Misiyanto, and K. R. Mulia, "Serba-Serbi Kurikulum Merdeka Kekhasan Sekolah Dasar," *Jakarta: Tim Pusat Kurikulum dan Pembelajaran (Puskurjar), BSKAP*, 2022.

[8] H. Surikno and S. Wahyuni, "Kompetensi Pengetahuan Siswa Menggunakan Smart Apps Creator (SAC) Di Sekolah Dasar," *Jurnal Pendidikan Tambusai*, vol. 7, no. 1, pp. 3911–3916, Apr. 2023, doi: 10.31004/jptam.v7i1.5866.

[9] M. Uliyandari and S. Sutarno, "The Development of Android-Based TMC (Thermochemical) Learning Media Assisted by Smart Apps Creator to Improve Students' Learning Outcomes," *SEJ (Science Education Journal)*, vol. 7, no. 1, pp. 33–56, May 2023, doi: 10.21070/sej.v7i1.1636.

[10] S. O. R. Yallah and Y. Huda, "Pengembangan Media Pembelajaran Smart App Creator3 Berbasis Android pada Mata Pelajaran Kerja Bengkel dan Gambar Teknik di SMKN 1 Sumatera Barat," *Jurnal Pendidikan Tambusai*, vol. 6, no. 1, pp. 1244–1255, 2022.

[11] Sugiyono, *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta, 2017.

[12] H. Dheanova, M. Hakim, and D. Angga, "Pengembangan Media Interaktif Permainan Tradisional Lombok Berbasis Smart Apps Creator 3 Pada Kelas III SDN Sintung Timur," *Jurnal Pedagogik Olahraga*, vol. 10, no. 2, pp. 369–382, 2024.

[13] E. Y. P. Nasution and N. F. Siregar, "Pengembangan Media Pembelajaran Berbasis Prezi," *Tarbawi : Jurnal Ilmu Pendidikan*, vol. 15, no. 2, pp. 205–221, Dec. 2019, doi: 10.32939/tarbawi.v15i02.466.

[14] N. Nursalimah and A. Sutisna, "Pengembangan Media Pembelajaran Interaktif Berbasis Android Smart Apps Creator (SAC) Pada Pembelajaran IPAS di SDN Kawahmanuk," *INVENTA*, vol. 8, no. 2, Sep. 2024, doi: 10.36456/inventa.8.2.a9601.

[15] M. Anggraini and I. Mahmudah, "Penggunaan Media Konkret untuk Meningkatkan Hasil Belajar Siswa Kelas VI pada Mata Pelajaran Matematika," *JEID: Journal of Educational Integration and Development*, vol. 3, no. 2, pp. 125–131, Jun. 2023, doi: 10.55868/jeid.v3i2.301.

[16] Uswatun Hasana, Muhammad Nawir, and Sadriana Ayu, "Pengaruh Smart Apps Creator Berbasis Android Terhadap Hasil Belajar Biologi MA Al-Hidayah Lemoa Kab. Gowa," *Didaktik : Jurnal Ilmiah PGSD STKIP Subang*, vol. 10, no. 1, pp. 1677–1685, Mar. 2024, doi: 10.36989/didaktik.v10i1.2726.

[17] Y. Ramadhoni and Z. Muchtar, "Development of Integrated Smart Apps Creator Media with Guided Inquiry Learning Model on Reaction Rate Material," *Jurnal Teknologi Pendidikan : Jurnal Penelitian dan Pengembangan Pembelajaran*, vol. 9, no. 3, p. 516, Jul. 2024, doi: 10.33394/jtp.v9i3.11998.

[18] M. N. H. H. Jono, A. A. Aziz, M. Ibrahim, and N. M. Noh, "Instructional Design and Learning Theory on the Development of C++ Programming Multimedia Content," *Procedia Soc Behav Sci*, vol. 67, pp. 335–344, Dec. 2012, doi: 10.1016/j.sbspro.2012.11.336.

[19] G. A. D. Sugiharni, "Pengujian Validitas Konten Media Pembelajaran Interaktif Berorientasi Model Creative Problem Solving," *Jurnal Penelitian dan Pengembangan Pendidikan*, vol. 2, no. 2, p. 88, Aug. 2018, doi: 10.23887/jppp.v2i2.15378.

[20] G. T. Al Haq, N. Sismulyasih SB, and P. D. Purwati, "Canva-based Smart Apps Creator Media to Enhance Comprehension Skills of Informational Text for Third-Grade Students," *International Journal of Elementary Education*, vol. 8, no. 2, pp. 385–393, Jun. 2024, doi: 10.23887/ijee.v8i2.77090.
[21] D. Mariyati, P. S. Cholifah, and S. Sukamti, "Pengembangan Media Pembelajaran Interaktif Berbasis Aplikasi Android Tema Organ Gerak Hewan dan Manusia untuk Kelas V Sekolah Dasar," *Jurnal Pembelajaran, Bimbingan, dan Pengelolaan Pendidikan*, vol. 1, no. 12, pp. 991–1002, Apr. 2022, doi: 10.17977/um065v1i122021p991-1002.
[22] J. Creswell, *Riset Pendidikan*, 1st ed. Yogyakarta: Pustaka Pelajar, 2015.
[23] M. N. Wardani, M. Basori, and W. I. Zaman, "Pengembangan Media Interaktif Berbasis Smart Apps Creator Materi Perubahan Bentuk Energi pada Kelas IV SDN Kuwik 2," *Pendekar : Jurnal Pendidikan Berkarakter*, vol. 7, no. 2, pp. 79–87, 2024.
[24] Torang Siregar, "Stages of Research and Development Model Research and Development (R&D)," *DIROSAT: Journal of Education, Social Sciences & Humanities*, vol. 1, no. 4, pp. 142–158, Oct. 2023, doi: 10.58355/dirosat.v1i4.48.
[25] Sugiyono, *Metode Penelitian Pendidikan: Pendekatan Kuantitatif, Kualitatif, dan R & D*. Bandung: Alfabeta, 2015.

 https://doi.org/10.58421/gehu.v4i2.444