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Development of web-based smart apps creator (SAC) interactive media for respiratory material in fifth grade at elementary school

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ABSTRACT

The development of interactive respiratory learning media at SDN Sidomulyo 1 Krian Sidoarjo is not optimal, that students tend to feel bored during the learning process. This study aimed to create a web-based interactive media using Smart Apps Creator (SAC) that is acceptable, meets standards, and is practical to use for teaching material for fifth-graders. This study used a Research and Development method with the ADDIE model, which consists of five phases: analysis, planning, development, implementation, and evaluation. The subjects of this study were 21 fifth-graders at State Elementary School Sidomulyo 1 Krian. Data were collected through validation questionnaires from media experts, subject matter experts, and feedback from both the teacher and students. Data were analyzed using descriptive techniques, including quantitative descriptive analysis. The media expert validation was 91.25%, and the subject matter expert validation achieved 92.08%, both categorized as "Very Valid." The practicability assessment from the fifth-grade teacher was 94%, while the students' practicality results was 96.14%, both categorized as "Very Practical." Therefore, it can be concluded that the web-based Smart Apps Creator (SAC) interactive Learning media developed is suitable and practical for use in the fifth-grade Natural and Social Sciences curriculum at elementary schools.

INTRODUCTION

Education can be defined as knowledge, skills, and experience to students (Arifin et al., 2022). The impact of education is that students can adapt to the environment and its surroundings to become useful human beings. In 2013-2019 the 2013 curriculum was implemented, but since Covid-19, teaching and learning activities transformed to online learning. Education in Indonesia uses the Merdeka Curriculum, driven by rapid technological advancements and the learning loss caused by the pandemic, which, if not addressed, could lead to educational failure (Miladiah et al., 2023; Mursidi et al., 2023; Liem et al., 2024). Thus, the independent learning curriculum must be developed and implemented for all levels of education in Indonesia, while the independent curriculum according to (Usmeldi et al., 2023) is a curriculum that emphasizes the learning process and characteristics of students to develop according to their potential and talents (Rahayu et al.,

2022) argue that the independent curriculum allows students to think and learn from all sources. The independent curriculum is related to teaching media such as increasing flexibility, interactivity and the quality of learning.

Educators are not only required to teach, but must also have the ability to use technology for transformation. Educators are expected to be able to design innovative, creative, and fun classes for students, so that the learning process becomes more effective and interesting, thus, teachers can improve the quality of learning and help students achieve their potential (Johnson et al., 2016; Wen, 2024; Kuo, 2024). In this digital era, educators must have broad competencies, including IT mastery, Educators are required to have adequate technological skills to improve the quality of learning (Indira et al., 2020; Jarjabka et al., 2024; Jang & Choi, 2025). According to (Lao et al., 2018) An elementary school educator has not fully utilized digital competencies, despite having a strong educational background and experience. Possessing certificates, training, academic degrees, and teaching experience does not automatically ensure a teacher's professionalism in the digital age.

Learning media deliver material and serve as effective entertainment to eliminate students' boredom during direct learning. (Magdalena et al., 2021), while learning media opinion (Afinia & Nuruddin, 2023) is a tool used during the learning process which is useful for increasing the effectiveness and enthusiasm of students to learn. According to (Saifuddhin & Rochmania, 2023) learning media can make it easier for students to receive messages conveyed by the teacher. According to (Sukaryono & Susilo, 2024) the benefits of learning media in the learning process can increase the desire and interest of students to participate and have a psychological effect on students. According to (Suryani et al., 2019) learning media is a means of conveying information that can stimulate the minds and interests of students, so that they can gain knowledge better. Due to limited facilities and infrastructure, educators often do not create and use learning media. In addition, the reason educators rarely create and use learning media is the many demands that educators must meet because in the independent curriculum, an educator is required to be professional, have expertise in learning methods, curriculum, and IT utilization.

The use of information and communication technology in learning media aims to make it easily accessible to everyone (Yunus & Fransisca, 2020) According to (Jannah & Nuruddin, 2025) combining technology and learning media can prevent students from getting bored easily in learning. Along with the development of the era, the use of interactive learning media is becoming increasingly popular. According to (Chen et al., 2013; Šorgo et al., 2023; Liem et al., 2024) Online learning via mobile devices allows students to access learning materials anywhere and anytime. This platform also facilitates student collaboration and creativity in sharing materials, experiences, and information with peers, thereby increasing learning effectiveness. Interactive media can improve students' interest and motivation to learn, so that students can be more active and not easily bored in the learning process. Smart Apps Creator was chosen as a tool for developing learning applications by offering great potential in creating more interesting and easy-to-understand materials (Fahri, 2022). (Amajida, 2020) stated that the advantages of Smart Apps Creator include creating applications without coding, designing attractive applications, an easy-

to-understand display, exporting projects to HTML5, and not requiring a lot of RAM. The researcher's novelty with previous researchers conducted by (Julianto & Elviana, 2022) is using Android-based Smart Apps Creator (SAC) interactive media on temperature and heat material in science subjects, while this study develops web-based Smart Apps Creator (SAC) interactive media on respiratory material.

The relationship between Smart Apps Creator (SAC) interactive media and learning material is that it can facilitate visualization, interactivity, simulation, quizzes and assessments. Based on the explanation above, the researcher wants to develop a study entitled "Development of Web-Based Smart Apps Creator (SAC) Interactive Media on Respiratory Material for fifth-grade SDN Sidomulyo 1 Krian Sidoarjo". This study aims to develop interactive media using Smart Apps Creator (SAC) which can help fifth graders learn learning material better and determine the validity of interactive media for students.

METHOD

This study used Research and Development (R&D) to develop and test products in the form of web-based interactive media on social sciences, learning material for fifth-graders. This method used to produce effective products in learning is the development method (Sugiyono, 2013) Through five stages, namely Analysis, Design, Development, Implementation and Evaluate created by Dick and Carry in the study (Maliki, 2021) is the type of research used in this study.

Figure 1. Cycle of ADDIE Model
(Source: (Surjono, 2017))

Media experts and material experts are validators to test the validity of interactive media, while teachers and students of fifth grade at State Elementary School Sidomulyo 1 Krian Sidoarjo are research subjects who are tested to find out how practical the web-based Smart Apps Creator (SAC) interactive media is when used in the learning process. This study uses both qualitative and quantitative data to enhance the validity and reliability of the results. Qualitative data includes field notes, critiques, suggestions, and comments from material and media expert validators on the Smart Apps Creator (SAC) media. Quantitative data assessed the validation results from material experts, media experts, and student response questionnaires regarding the SAC interactive media.The data collection technique in this study uses qualitative and quantitative data types,

namely observation, interviews, questionnaires, documentation, and field notes. While the data analysis techniques used to realize the research objectives, the steps taken are media validation analysis and media practicality analysis:

Data Analysis Technique

This includes the validation of media and materials for the web-based Smart Apps Creator interactive media, tested and validated by media and material experts, using questions with answers based on a 1-5 Likert scale, as shown in the table below:

Table 1. Likert Scale

Score	Category
5	Strongly Agree
4	Agree
3	Neutral
2	Disagree
1	Strongly Disagree

(Sugiyono, 2013)

The Aiken's V validity test is used to analyze the data obtained from the validation results by media and material experts. A statement is considered "Valid" if the value is ≥0.67. If the validity score is below 0.67, the web-based Smart Apps Creator (SAC) interactive media is considered invalid. To determine the validity level of the media, the following Aiken's V validity scale is used:

Table 2. Aiken's V Validity Rating Guidelines

No	Interval score	Category
1	0.80 < V < 1.00	Very Valid
2	0.60 < V < 0.80	Valid
3	0.40 < V < 0.60	Moderately Valid
4	0.20 < V < 0.40	Invalid
5	0.00 < V < 0.20	Strongly Invalid

(Hendryadi, 2014)

Practicality Analysis Technique

Practicality analysis is used to assess the practicality of the interactive media using data from questionnaires filled by namely students and class teachers. The data were analyzed using a Likert scale of 1-5 as in table 1, while to determine the percentage level of practicality according to the student and class teacher response questionnaire using the formula updated by Purwanto in the study (Azlina & Zainil, 2021) The level of practicality criteria can be obtained from the final value in the following table:

Table 3. Practicality Score Criteria

No	Score	Criteria
1	86% - 100%	Very Practical
2	76% - 85%	Practical
3	60% - 75%	ModeratelyPractical
4	≤ 54%	Not Practical

(Azlina & Melva, 2021)

RESULTS

1. *Analysis*

Interviews with fifth-grade teachers at State Elementary School Sidomulyo 1 Krian Sidoarjo showed problems in learning, particularly in science subjects, due to the continued use of conventional media (textbooks, LKS, whiteboards, etc.), as a result, students quickly get bored, in addition, the use of information and communication technology is not optimal.

The results of interviews with researchers and teachers explain that the presence of assistance in the form of images or videos can help students understand a material. The results of the analysis found a solution in the form of developing interactive media that students can easily access via PC, Laptop, or Smartphone, namely the web-based Smart Apps Creator (SAC) interactive media that can be accessed anytime and anywhere. Researchers expect that there will be convenience in the learning process and provide interest for students when using the interactive media that will be developed.

2. *Design*

The design or planning stage solve the problems identified during the analysis phase. various preparations need to be made such as compiling materials, designing displays, or collecting media materials to create learning media based on existing needs. This stage needs to be carried out to facilitate developers in the process of creating media.

3. *Development*

After designing the layout, the next step is to implement the design into a product ready for trial with students during the learning process. The developed product must undergo a validation process by experts, both in content and media, to obtain feedback and suggestions. These suggestions are used to make improvements, allowing the developer to revise the product until it is validated and suitable for student use in the learning process.

a. Media Expert Validation

The media validation of the web-based Smart Apps Creator interactive media for respiratory material was conducted by two expert lecturers: Reza Augusta Jannatul Firdaus, M.Si., a lecturer in the Information Systems Department, Faculty of Information Technology, UNHASY, and Anggara Dwinanta, M.Pd., a lecturer in the Elementary School Teacher Education Department,

Faculty of Education, UNHASY. The media validation was carried out on November 25 & 26, 2024.

Below is the result of the media validation for the web-based Smart Apps Creator (SAC) interactive media:

Table 4. Data from Media Expert Evaluation

No	Media Expert	Real score	Max score	Percentage	Category
1	Media Expert I	140	150	93,33%	Very Valid
2	Media Expert II	139	150	92,66%	Very Valid
Average		139,5	150	91,25%	Very valid

b. Material Expert Validation

The material expert evaluation of the web-based Smart Apps Creator interactive media for learning material was conducted by one lecturer and one fifth-grade teacher: Andri Wahyu Wijayadi, S.Si., M.Pd., a lecturer in the Department of Natural Sciences, Faculty of Education, UNHASY, and Rurun Wiji Ismilah, S.Pd, SD, a fifth-grade teacher at SDN Sidomulyo 1 Krian Sidoarjo. The material validation took place on November 28 & 29, 2024.

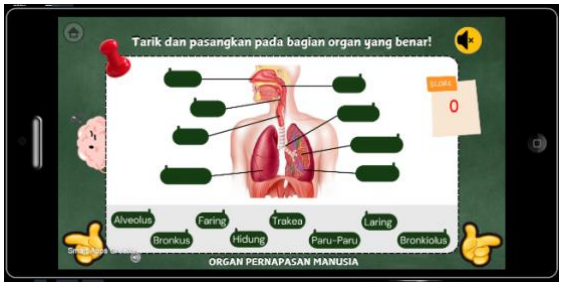
Below is the result of the material validation for the web-based Smart Apps Creator (SAC) interactive media:

Table 5. Data from Material Expert Evaluation

No	Media Expert	Real score	Max score	Percentage	Category
1	Media Expert I	137	150	91,33%	Very Valid
2	Media Expert II	144	150	96,00%	Very Valid
Average		140,5	150	92,08%	Very Valid

Based on the table above, the validation results from the experts show a percentage of 91.2% from media experts and 92.0% from material experts, both categorized as "very valid." Therefore, the web-based Smart Apps Creator interactive media is considered valid and suitable for use in teaching. Several suggestions and feedback were provided for the Smart Apps Creator (SAC) interactive media, such as improvements to the menu display, the use of inaccurate wording, and the addition of material on preventing respiratory disorders. Below are some screenshots of the web-based Smart Apps Creator (SAC) interactive media that has undergone the validation process:

Table 6. Display of the Smart Apps Creator (SAC) Web-Based Media

No	Layout	No	Layout
1	 Description: Splash screen display in web-based interactive media Smart Apps Creator	2	 Description: Display title menu / home menu
3	 Description: Changes to the main menu that adds a references menu	4	 Description: Display of the learning objectives menu
5	 Description: Display of the user manual menu	6	 Description: Display of the material menu in the Smart Apps Creator interactive media
7	 Description: Display of the human respiratory organ material menu	8	 Description: Display of the human respiratory mechanism material menu
9	 Description: Display of respiratory disorders material menu	10	 Description: The result of the quiz menu revision by adding game pointers.

11		12	
	Description: Developer profile view		Description : Display of References Menu

c. Implementation

In the implementation stage, the researcher tested the use of the web-based Smart Apps Creator (SAC) interactive media to collect data from student feedback on the developed media. The media which is proper for use by media and material experts were tested in large group testing. The subjects were 21 students, including 10 boys and 11 girls.

a. Small Group Test

The small group test was conducted on December 2, 2024, with fifth-grader from from State Elementary School Sidomulyo 1 Krian Sidoarjo. The interactive media was distributed by sharing an HTML link with the students, and the questionnaire used was a Google Form, shared within the final display of the interactive media. Below are the results of the web-based Smart Apps Creator (SAC) interactive media evaluation during the small group test:

Table 7. Data from Student Evaluation in the Small Group Test

No	Interval	Criteria	Frequency	Percentage
1	86% - 100%	Very Practical	4	90,5%
2	76% - 85%	Practical	1	9,5%
3	60% - 75%	Moderately Practical	0	0,0%
4	≤ 54%	Not Practical	0	0,0%
Total			5	100%

Based on the table above, the results of the small group test showed that 5 students gave a score of 89.4%, which falls into the "very practical" category. Therefore, the developed interactive media is categorize as suitable to proceed to the large group test.

b. Large Group Test

The large group test is similar to the small group test, except that the subjects are more numerous. This test was conducted on December 3, 2024, with the fifth-grade teacher and 21 fifth-graders from State Elementary School Sidomulyo 1 Krian Sidoarjo. The evaluation from the fifth-grade teacher yielded a score of 94%, categorized as "very practical," while the evaluation results of the web-based Smart Apps Creator (SAC) interactive media by the students are presented in the following table:

Tabel 8. Data Hasil Penilaian Peserta Didik Pada Uji Coba Kelompok Besar

No	Interval	Criteria	Frequency	Percentage
1	86% - 100%	Very Practical	19	97,94%
2	76% - 85%	Practical	2	2,06%
3	60% - 75%	Moderately Practical	0	0,00%
4	≤ 54%	Note Practical	0	0,00%
Total			21	100%

Based on the results of the large group test, the teacher's response was 94%, and the 21 students received a percentage of 96.14%, both categorized as "very practical." Therefore, it can be concluded that the web-based Smart Apps Creator (SAC) interactive media is very practical for use in teaching the respiratory material in the fifth-grade social and natural science curriculum. According to the teacher's feedback, the SAC interactive media makes learning more engaging for students.

d. Evaluate

The final stage of the development research is the evaluation stage. In the evaluation stage, the results of the implementation of the practicality questionnaire of the class teacher and student responses regarding the interactive media Smart Apps Creator (SAC) that has been used in the learning process were obtained. The results of the teacher's responses was 94% while the results of the student's responses was 96.14%, which means that both were "very practical". Based on the percentage value of the media's practicality, it is concluded that the web-based interactive media Smart Apps Creator (SAC) meets the requirements for use in learning social sciences for class V respiratory material without the need for revision.

DISCUSSION

The validation results from media and material experts show that web-based interactive Smart Apps Creator (SAC) media is classified as very valid, with 91.25% and 92.08%, respectively. This finding strengthens Jennah's (2009) view that learning using media has many active activities. Several research results from Sugiarto (2020), Han (2024), Sanfo (2025) state that several factors, including intelligence, talent, interests, motivation, and the learning methods used influence student learning outcomes. These factors can significantly impact students' ability to achieve optimal learning outcomes. According to Arifin et al., (2022), the media designed can be considered very practical because it meets the criteria for selecting effective media, namely being able to convey concepts, improve mastery of material, explain information well, and foster active student involvement. According to Munir (2015), Deng et al (2024), Chen & Tsai (2025), the use of interactive media tends to improve student learning outcomes, especially in complex natural science materials, because this media can facilitate the depiction of mechanisms that are difficult to understand to be clearer.

The use of interactive media in science learning significantly overcomes the boredom often experienced by students due to the use of conventional media (Fajri et al., 2016; Nirwana et al.,

2024). Visualization through animated displays, interactive menus, and quizzes inserted into the media have been shown to increase learning engagement. This is in line with the constructivist learning theory which emphasizes the importance of active and meaningful learning experiences (Zajda & Zajda, 2021) Furthermore, technology-based learning such as SAC is in line with the principles of the independent curriculum which prioritizes personalization and flexibility of learning (Widiyanti et al., 2025; Al-Amin et al., 2024). In this context, the media developed supports students to learn according to their own pace and learning style (Kaswan et al., 2024).

Validation and revision stages based on expert input show that the development process follows the iterative principle in instructional design. Furthermore, the trial results show that the use of this media has a positive impact on student motivation and participation. This strengthens the opinion of (Nurhaliza et al., 2025) and (Ningrum et al., 2024) that digital-based interactive media can improve learning outcomes and student involvement in the learning process. This involvement is very important, especially in science learning that requires an understanding of abstract concepts such as the respiratory system (Seher Budak & Defne Ceyhan, 2024) Thus, the web-based Smart Apps Creator (SAC) interactive media is not only feasible and practical to use, but also makes a significant contribution to the quality of the teaching and learning process. This media can be a strategic alternative in science learning in elementary schools, especially in increasing the effectiveness of delivering conceptual and visual material.

CONCLUSION

Based on the development of interactive media Smart Apps Creator (SAC) based on the web on the respiratory material in fifth grade of elementary school, It can be concluded that: (1) the results of the validation of media experts were 91.25%, while the results of the validation from material experts were 92.08%, categorized as "Very Valid"; (2) The results of the practicality of the media from the small group test was 89.4%, categorized as "Very Practical". The result of Media testing in the large group was 96.14% categorized as "Very Practical". While the results of the response of fifth-grade teacher was 94% categorized as "Very Practical". Therefore, the interactive media Smart Apps Creator (SAC) based on the web has proven to have very valid criteria so that it can be stated as feasible and practical to be applied in the process of learning activities of science and science on the material of respiratory in fifth class of elementary schools. The impact of this media can increase student learning involvement and understanding of concepts more comprehensively through attractive visual and interactive presentations.

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