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Needs Analysis of Interactive Learning Media Based on Smart Apps Creator for Natural and Social Sciences in Elementary School

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A B S T R A C T

This study aims to assess the necessity of Smart Apps Creator-based interactive learning media for teachers and students within the context of Natural and Social Sciences instruction in elementary schools. Employing a descriptive research design, this study involved 5 classroom teachers and 25 elementary students from the Watukumpul District, Pemalang Regency, as participants. Primary data were gathered using Likert-scale questionnaires to objectively map the needs profile, followed by quantitative descriptive analysis. Empirical evidence reveals that the urgency of teachers' requirements for interactive learning media falls into the very high category, achieving a mean score of 4.28. Key aspects highlighted by educators included concept visualization, media usability, and efficacy in stimulating student engagement. Correspondingly, student responses reflected a very high level of need, with a mean score of 4.58, specifically emphasizing a preference for interactive quizzes, audiovisual content, and an engaging user interface. The alignment of these findings underscores the critical need for accessible and visually rich media for Natural and Social Sciences subjects. Consequently, developing media utilizing Smart Apps Creator is proposed as a relevant solution to enhance the quality of elementary education.

1. Introduction

The advancement of digital technology has catalyzed a significant transformation in pedagogical practices within elementary education, particularly regarding the deployment of interactive learning media. Contemporary instructional media has evolved beyond its traditional role as a mere delivery aid; it now serves as a pivotal instrument for fostering active student participation in the educational process (Aisyah et al., 2025). Within the context of Natural and Social Sciences instruction which merges scientific and social concepts instructional tools are required to present content in an integrated, tangible manner that aligns with learners'

developmental characteristics (Viorenica & Aprima, 2025). Nevertheless, empirical observations suggest that the utilization of interactive media specifically tailored to the necessities of educators and students remains suboptimal.

Various research outcomes indicate that interactive digital media plays a pivotal role in enhancing student motivation, engagement, and the overall quality of learning experiences at the elementary level (Syafaatussalamah & Salsabilla, 2025; Surbakti & Chantrin, 2025). Such media empowers students to interact directly with instructional content through multimedia elements including visuals, animations, audio, and responsive activities thereby facilitating a deeper conceptual understanding (Azzahra et al., 2025). Furthermore, the utilization of interactive tools fosters a more dynamic and meaningful educational environment for young learners (Akmal et al., 2025). Collectively, these findings underscore the critical necessity of integrating interactive media into Natural and Social Sciences instruction.

In response to this escalating need, educators have begun to adopt various platforms for digital media development. Among these, Smart Apps Creator has emerged as a widely utilized tool. This application empowers teachers to construct app-based interactive learning media effortlessly, eliminating the prerequisite of complex programming skills (Aprilianti & Erita, 2025; Saa'dah et al., 2025). Previous research by Rukoyah & Bektiningsih (2024) demonstrates that media developed using Smart Apps Creator possesses a high level of feasibility and suitability for elementary education. Corroborating these results, Sari et al. (2024) asserted that this platform effectively supports the delivery of Natural and Social Sciences content in a more systematic and engaging manner. Furthermore, Smart Apps Creator offers a practical alternative for educators to design media tailored to the characteristics of elementary students, as it facilitates visual and structured content presentation through a user-friendly interface.

Nevertheless, the preponderance of existing literature regarding Smart Apps Creator remains heavily concentrated on the development phases and product feasibility testing. These studies predominantly evaluate the quality of the media post-production, rather than investigating user requirements prior to the design phase. For instance, Aisyah et al. (2025) noted that SAC based media exhibits superior quality regarding design and interface. Furthermore, Safitri et al. (2024) emphasized that utilizing this tool holds significant potential in bolstering the instructional process. This application not only streamlines the creation of interactive media tailored to the 'digital generation' of students but also facilitates the delivery of contextual and participatory content without necessitating complex programming expertise (Aprilianti & Erita, 2025). Moreover, empirical evidence from various implementation studies confirms that SAC based media is feasible, practical, and effective. This includes proven benefits in enhancing student learning outcomes and fostering 21st-century skills, such as creativity and active engagement (Sipayung et al., 2025). However, these prior inquiries have not yet specifically mapped the distinct needs of teachers and students to serve as a foundational basis for media design.

Needs analysis constitutes a fundamental preliminary phase in the development of instructional media, as this process enables researchers or developers to acquire actual insights regarding pedagogical conditions in the field, learner characteristics, and the requisite instructional necessities. Consequently, the resulting instructional tools will possess greater relevance, effectiveness, and alignment with the authentic learning context found in elementary schools (Raharjo et al., 2024). Comprehending the specific requirements and attributes of students serves as a critical determinant in the design of effective digital learning media. Such analysis extends beyond mere content and technological aspects; it also encapsulates learner profiles, ensuring that the developed media addresses learning requirements contextually and remains pertinent to actual classroom dynamics (Maisarah et al., 2023). Furthermore, other studies posit that conducting a needs analysis assists developers in crafting instructional media that is congruent with the educational context, user proficiency, and learning objectives (Meliyani et al., 2022).

Within elementary Natural and Social Sciences instruction, interactive media must align with students' visual, interactive, and experiential learning characteristics. Media integrating visuals, animations, and simulations significantly enhance engagement, motivation, and conceptual understanding compared to conventional formats (Prayoga et al., 2025; Oktania et al., 2025). From teachers' perspectives, instructional tools must also be practical, flexible, and easy to integrate into pedagogical workflows to improve instructional effectiveness (Sawitri et al., 2024). Moreover, differences in perceptions between teachers and students can affect the successful implementation of digital media, making balanced needs analysis essential (Aisyah et al., 2025).

Research concerning interactive learning media demonstrates significant potential for enhancing the quality of instruction at the elementary level (Sawitri et al., 2024; Raudah et al., 2024). Nonetheless, scholarly inquiries specifically investigating the requirements of educators and students regarding Smart Apps Creator-based interactive media within Natural and Social Sciences instruction remain relatively scarce. A significant portion of existing media needs analyses tends to be generalized, failing to specifically scrutinize the Smart Apps Creator platform. Concurrently, studies focused on Smart Apps Creator predominantly center on the outcomes of media development rather than the preliminary mapping of user necessities.

In light of the preceding discussion, a notable research gap persists regarding the necessity for a focused investigation into the specific requirements of educators and students concerning Smart Apps Creator-based interactive media for Natural and Social Sciences instruction at the elementary level. This inquiry is anticipated to provide empirical insights into the authentic necessities of users, thereby serving as a foundational baseline for designing instructional media that is relevant, contextual, and aligned with the specific attributes of Natural and Social Sciences education. Consequently, the primary objective of this research is to comprehensively analyze the needs of teachers and students regarding interactive learning media utilizing Smart Apps Creator within the context of elementary school Natural and Social Sciences instruction.

2. Methodology

This research adopts a descriptive methodological framework with the specific objective of analyzing the requirements of educators and students concerning Smart Apps Creator-based interactive learning media within the context of Natural and Social Sciences in elementary schools. The rationale for selecting a descriptive design lies in the study's intent; rather than evaluating the efficacy of a developed product or comparing distinct experimental treatments, the primary goal is to acquire a factual and profound understanding of authentic user necessities. This understanding serves as the fundamental basis for designing instructional media that is both relevant and contextually appropriate. The data accumulation process involves both quantitative and qualitative evidence, directly obtained from teachers and students, who represent the principal end-users of Natural and Social Sciences instructional resources.

The data collection process was executed across five elementary schools situated in the Watukumpul District, Pemalang Regency. The research cohort comprised five classroom teachers responsible for delivering Natural and Social Sciences instruction, alongside twenty-five elementary students actively participating in these lessons. To streamline the response process and facilitate efficient data compilation, the questionnaires were disseminated via digital forms.The pivotal instrument utilized in this investigation is a systematically structured needs analysis questionnaire, engineered to delineate the specific requirements of educators and students regarding Smart Apps Creator-based interactive learning media. The construction of this instrument was anchored in theoretical frameworks concerning interactive instructional media, the developmental characteristics of elementary students, and essential learning prerequisites. The instrument comprises two distinct categories: a teacher needs assessment and a student needs assessment, both of which were customized to align with the respective roles and attributes of the respondents.

The instrument testing process in this study was conducted through expert judgment validation by two validators, namely a school supervisor and a lecturer. This validation aims to assess the suitability of the content, clarity of construction, accuracy of language, and the relevance of each item to the indicators of the need for developing learning media for Natural and Social Sciences based on Smart Apps Creator. The teacher needs assessment was meticulously designed to diagnose educators' requirements for Natural and Social Sciences instructional media, grounded in actual classroom pedagogical practices. The questionnaire items encompassed the utilization of printed textbooks, the necessity for visualizing abstract scientific concepts, and the impediments educators face in independently developing instructional materials. Aspects for expert validation for the questionnaire instrument Student and Teacher Needs in Developing Learning Media for Science are presented in Table 1.

Table 1. Assessment Aspects and Expert Validation Indicators for the Questionnaire Instrument of Student and Teacher Needs in Developing Learning Media for Natural and Social Sciences

No	Validation Indicator
Content Validation	
1	Compliance of the questionnaire with the indicators
2	Clarity of instructions for completing the questionnaire
3	Suitability of the questionnaire to school level and grade level
Language and Writing	
4	The language used in the questionnaire conforms to Indonesian language rules.
5	The statement is clear and does not give rise to multiple interpretations.
6	The language used is simple and easy to understand

Furthermore, it probed perceptions regarding the capacity of digital media to stimulate student learning interest. Additionally, the instrument addressed the availability of digital infrastructure within the school, the demand for user-friendly media, and perspectives on Smart Apps Creator as a viable instructional alternative. It also assessed the interest and necessity for specific training in Smart Apps Creator, alongside educators' perceptions regarding the overall efficacy and efficiency of digital learning tools. The following indicators or aspects of the teacher needs questionnaire are presented in Table 2.

Table 2. Indicators or Aspects of Teacher Needs

No	Aspects Analyzed
1	Use of printed science books
2	The need for visualization of abstract concepts in Natural and Social Sciences
3	Difficulties in developing independent media
4	Digital media increases student interest
5	Availability of school digital devices
6	The need for easy to use media
7	Smart Apps Creator as an alternative to Natural and Social Sciences media
8	Interest in using Smart Apps Creator
9	Training needs Smart Apps Creator
10	Effectiveness and efficiency of digital media

The student needs questionnaire was formulated to unveil the specific requirements and preferences of learners regarding instructional media for Natural and Social Sciences. The items within the instrument probed various dimensions, including reliance on printed textbooks, challenges encountered in comprehending Natural and Social Sciences concepts solely through text, inclinations toward digital media, prior exposure to interactive tools, and comprehension enhancement via audiovisual aids. Additional analyzed dimensions included student interest in interactive quizzes or gamification elements, visual aesthetics, accessibility via digital devices, and home internet connectivity. Furthermore, the survey assessed the students' desire for engaging and enjoyable learning tools, aligning with established findings on learning characteristics within digital environments. The following indicators or aspects of the student needs questionnaire are presented in Table 3.

Table 3. Indicators or Aspects of Student Needs

No	Aspects Analyzed
1	The habit of using printed books
2	Natural and Social Sciences is difficult to understand only from books
3	Digital media preferences
4	Interactive Media Experience
5	Understanding through pictures/videos
6	Interactive quizzes/games
7	Color, animation, visual display
8	Access media via Android/Laptop
9	Internet access at home
10	The desire for interesting learning media

Both sets of questionnaires employed a five-point Likert scale, spanning from 'Strongly Agree' to 'Strongly Disagree.' The adoption of this five-tiered scale was intended to elicit a more nuanced variance in responses, thereby facilitating a more precise depiction of the respondents' level of agreement regarding each statement (Sugiyono, 2022). The investigation exclusively utilized closed-ended questionnaires, which were systematically structured to align with the specific dimensions required for analyzing the needs of Natural and Social Sciences instructional media. Data analysis was executed through a quantitative descriptive approach, entailing the assignment of scores to individual statement items in adherence to the Likert scale. Subsequently, the mean values for each requirement dimension were computed to strategically map the priorities for the development of interactive learning media. The Average Score Interpretation Criteria are presented in Table 4 below.

Table 4. Interpretation Criteria for the Average Score of the Likert Scale

Average Score Range	Criteria	Interpretation
4.21 – 5.00	Strongly Agree / Very High	The majority of respondents strongly agreed or stated that the conditions were very high.
3.41 – 4.20	Agree / High	The majority of respondents agreed or stated that the conditions were high.
2.61 – 3.40	Moderate Agree / Moderate	Respondents tend to be hesitant or state that the condition is moderate.
1.81 – 2.60	Disagree / Low	The majority of respondents disagreed or stated that conditions were low.
1.00 – 1.80	Strongly Disagree / Very Low	The majority of respondents strongly disagreed or stated that conditions were very low.

These criteria serve as benchmarks to ascertain the degree of respondent agreement across each dimension of instructional media requirements. Consequently, a lucid delineation of need categories is achieved, ranging from 'very low' to 'very high' intensity. Employing these interpretive standards empowers the researcher to pinpoint the priority requirements of educators and students concerning Smart Apps Creator-based interactive media in a manner that is both systematic and objective. The interpretive outcomes derived from the tabulated criteria are subsequently articulated descriptively within the findings section. This exposition serves to elucidate the prevailing trends regarding the requirements of educators and students

for Smart Apps Creator-based interactive learning media within the context of elementary Natural and Social Sciences instruction.

3. Results and Discussion

Results

Based on the results of expert validation conducted by two validators, namely school supervisors and lecturers, two average scores were obtained according to the questionnaire focus. The questionnaire to measure student needs indicators obtained an average score of 4.52 on a scale of 5.00, which is in the interval of 4.21–5.00, thus falling into the Strongly Agree / Very High category. This value indicates that the items are very appropriate to the student needs indicators, such as the use of printed books, interactive media experiences, visual displays, and the need for interesting media. Meanwhile, the questionnaire to measure teacher needs indicators obtained an average score of 4.38, which is also in the interval of 4.21–5.00, thus falling into the Strongly Agree / Very High category. These results confirm that the questionnaire items are highly relevant to the teacher needs indicators, including the visualization of abstract concepts, the effectiveness of digital media, the availability of devices, and the need for training. In terms of language and clarity of wording, both instruments were assessed as clear, communicative, and easy to understand. Thus, based on the assessment interval used, both questionnaires were declared very suitable for use without major revision.

Analysis of Student Needs Regarding the Development of Smart Apps Creator-Based Natural and Social Sciences Instructional Media

The student needs analysis was undertaken to acquire a factual overview regarding the learning experiences, media preferences, and specific challenges encountered by learners in comprehending Natural and Social Sciences content at the elementary level. Students at this educational stage are situated within the concrete-operational phase of cognitive development, necessitating visual scaffolding, interactivity, and contextualized content delivery. These elements are essential to ensure that the learning process is meaningful, rather than remaining solely abstract. A recapitulation of the analysis results, derived from questionnaires completed by 25 student respondents, is presented in Table 5.

Table 5. Summary of the Results of the Analysis of Student Needs for the Development of Science Learning Media Based on Smart Apps Creator

No	Aspects Analyzed	Average Score	Criteria
1	The habit of using printed books	4.36	Very High
2	Natural and Social Sciences is difficult to understand only from books	4.44	Very High
3	Digital media preferences	4.56	Very High
4	Interactive Media Experience	4.48	Very High
5	Understanding through pictures/videos	4.60	Very High
6	Interactive quizzes/games	5.00	Very High

7	Color, animation, visual display	4.56	Very High
8	Access media via Android/Laptop	4.40	Very High
9	Internet access at home	4.32	Very High
10	The desire for interesting learning media	4.64	Very High
	Overall Average	4.58	Very High

The summary of the student needs analysis reveals that all evaluated dimensions achieved elevated mean scores, signifying a substantial demand for Natural and Social Sciences instructional media that is both more diverse and interactive. Specifically, while a mean score of 4.36 regarding the usage of printed textbooks suggests they remain a prominent resource for students, the score of 4.44 concerning the difficulty of grasping Natural and Social Sciences concepts exclusively through books highlights significant limitations when learners rely solely on textual content. Student inclination toward digital media is evidenced by a mean score of 4.56, whereas prior engagement with interactive tools yielded a score of 4.48. These findings suggest that learners are not only receptive to digital formats but also possess a degree of familiarity with their pedagogical application. Furthermore, the score of 4.60 regarding comprehension via imagery and video corroborates the critical function of visual representation in facilitating the understanding of abstract Natural and Social Sciences concepts, such as natural processes and social phenomena.

The dimension of interactive quizzes and games garnered the highest mean score of 5.00, illustrating a profound student preference for participatory and challenging instructional activities. This metric strongly suggests that gamification elements possess significant potential to foster active student engagement. Furthermore, the attributes of color schemes, animation, and visual interface received a score of 4.56, demonstrating that the caliber of visual design substantially influences learner attention and interest in instructional media. Regarding infrastructure, scores for media accessibility via Android or laptop (4.40) and home internet availability (4.32) indicate that, in general, students possess adequate access to devices and connectivity, although this accessibility may not be entirely uniform. Notably, the second-highest rating trailing only interactive quizzes was assigned to the desire for engaging learning media (4.64). This affirms that students hold high expectations for an educational experience that is enjoyable, non-monotonous, and relevant to their personal contexts

With an overall mean score of 4.58, student demand for digital and interactive Natural and Social Sciences instructional media falls within the 'very high' category. This evidence suggests that learners are no longer adequately served by static, monodirectional, and text-centric resources. Conversely, there is a requisite for media that facilitates concept visualization, active interaction, and engaging educational experiences. Therefore, it is concluded that the development of Natural and Social Sciences instructional media based on Smart Apps Creator is highly pertinent to the current requirements of elementary students, specifically in fostering learning environments that are contextual, participatory, and developmentally appropriate.

Analysis of Teacher Needs Regarding the Development of Smart Apps Creator-Based Natural and Social Sciences Instructional Media

The analysis of teacher needs constitutes a pivotal phase in this research, designed to gain a comprehensive understanding of the perceptions, preparedness, and challenges faced by educators. Specifically, it examines their capacity to implement and develop instructional media that aligns with student requirements and the imperatives of the 21st-century curriculum. Consequently, mapping these educator needs serves as a fundamental baseline for guiding the media development process, ensuring the final product is not only technically proficient but also contextually responsive to authentic classroom dynamics. A recapitulation of the analysis results, obtained from five responding teachers, is presented in Table 6.

Table 6. Summary of the Results of the Analysis of Teacher Needs for the Development of Science Learning Media Based on Smart Apps Creator

No	Aspects Analyzed	Average Score	Criteria
1	Use of printed science books	4.00	High
2	The need for visualization of abstract concepts in Natural and Social Sciences	4.60	Very High
3	Difficulties in developing independent media	4.00	High
4	Digital media increases student interest	4.60	Very High
5	Availability of school digital devices	4.00	High
6	The need for easy to use media	4.60	Very High
7	Smart Apps Creator as an alternative to Natural and Social Sciences media	4.00	High
8	Interest in using Smart Apps Creator	4.40	Very High
9	Training needs Smart Apps Creator	4.20	High
10	Effectiveness and efficiency of digital media	4.40	Very High
	Overall Average	4.28	Very High

The tabulated summary of the teacher needs analysis reveals that all evaluated dimensions secured mean scores exceeding 4.00. This trend indicates that educators collectively maintain a positive outlook and express a substantial necessity for the development of digital-based Natural and Social Sciences instructional media. Specifically, the dimensions addressing the 'visualization of abstract concepts' and the 'potential of digital media to stimulate student interest' both attained the highest rating of 4.60. These figures imply a consensus among teachers that conventional pedagogical tools most notably printed textbooks are currently inadequate for fully elucidating the abstract and complex nature of Natural and Social Sciences subject matter.

The dimension assessing interest in utilizing Smart Apps Creator yielded a score of 4.40, signaling a strong inclination among educators to adopt this platform as a viable alternative for Natural and Social Sciences instruction. This observation is bolstered by the score of 4.20 regarding the necessity for specific training, which suggests that despite their enthusiasm, educators require technical competency enhancement to leverage the application optimally. Furthermore, the dimensions concerning reliance on printed textbooks, challenges in independent media

development, availability of digital infrastructure, and the perception of Smart Apps Creator as an instructional substitute all converged at a score of 4.00. These figures indicate that while educators remain moderately dependent on traditional texts and encounter constraints regarding both independent media creation and digital facility access, they nonetheless remain receptive to technology-driven instructional innovations.

The dimension evaluating the effectiveness and efficiency of digital media secured a score of 4.40, reflecting the educators' conviction that such tools can simultaneously elevate instructional quality while streamlining time and effort during content delivery. With a cumulative mean score of 4.28, the educators' demand for Smart Apps Creator-based Natural and Social Sciences instructional media is classified within the 'strongly agree' or 'excellent' category, in accordance with the established Likert scale interpretation benchmarks. This finding demonstrates a profound aggregate necessity among teachers for instructional media that is visually oriented, interactive, and user-friendly, while also being capable of bolstering student interest and comprehension of Natural and Social Sciences subject matter. Furthermore, this metric underscores a robust awareness among educators regarding the imperative of integrating digital media as a core component of elementary instructional strategies.

Figure 1 exhibits an intuitive navigation menu, illustrations relevant to the subject matter, and auxiliary features such as instructional videos and interactive quizzes. The structural layout is engineered to facilitate seamless content accessibility for learners while fostering active engagement throughout the instructional process. By synthesizing text, imagery, and animation tailored to the specific learning profiles of elementary students, this interactive tool ensures that the educational experience is rendered both impactful and meaningful. The user interface of the Smart Apps Creator-based Natural and Social Sciences instructional media utilized in this study is depicted in Figure 1.

Figure 1. Display of Smart Apps Creator-Based Science Learning Media (Source: https://appkuu.my.id/ekosistem/)

Discussion

The recapitulation of student needs data showed a total average score of 4.58, which explicitly indicates that students have a very strong preference for digital, interactive, and participatory learning media. This finding confirms the shift in student learning paradigms, which are now more responsive to digital platforms than conventional methods, as confirmed by surveys reporting high student interest in technology that offers easy access and attractive visualizations (Rinaldi et al., 2025; Wijaya et al., 2025). In the context of creating joyful learning, the use of interactive multimedia has been shown to increase student learning activities from the sufficient to excellent category due to the element of fun in the process of exploring the material, which is relevant to overcoming boredom in the classroom (Jannah et al., 2025). In addition, the integration of game or gamification elements such as challenges and point systems has been shown to be significant in maintaining students' intrinsic motivation to remain actively involved throughout the learning process (Surbakti & Chantrin, 2025; Mitjans et al., 2025). However, this analysis also needs to consider the possibility of a novelty effect, where high student enthusiasm may be temporary due to the novelty of the technology.

From the perspective of the learning resource gap, specific data demonstrate a paradox where students frequently use printed textbooks (score 4.36) but still find science material difficult to understand if sourced solely from text (score 4.44). This phenomenon reinforces the argument for the urgency of multimodal representation to bridge the abstraction of material that is not accommodated by print media alone. Visual presentation in the form of images, animations, and videos is crucial for reducing the level of abstraction of science concepts, so that students' conceptual understanding can significantly improve through the integration of narrative and visuals (Firman & Bancong, 2024; Putri & Muthi, 2025). Furthermore, the development of interactive multimedia-based science media is a strategic solution because science material in elementary schools often contains complex concepts such as food chains or ecosystems that require concrete visualization to stimulate students' critical thinking skills and not just memorization (Yunita & Firmansyah, 2025). Therefore, the new media developed must offer a solution-oriented transformation in presentation forms, not simply the digitization of textbooks.

A thorough analysis of the concept visualization needs aspect shows that the Understanding through images/videos item obtained the highest average score (4.60), confirming the dominance of visual learning styles in elementary school students. Students require dynamic visual stimuli to process information effectively, which is often limited to static media. The use of technology that harmoniously combines audio and visuals has been proven to clarify microscopic or abstract material, making it more tangible and easier for students to understand (Lutviana et al., 2025; Abidin et al., 2023). This relevance is supported by recent findings that interactive multimedia based on Smart Apps Creator, which combines text, images, and animation proportionally, has proven valid and practical in facilitating more meaningful learning (Rahmi et al., 2025). However, media development must be careful to avoid trapping students in cognitive load due to excessive visual displays that are irrelevant to the core learning objectives.

Turning to the interactivity preference aspect, the high scores on the Interactive Quizzes/Games (4.52) and Interactive Media Experience (4.48) items indicate students' demands to be actively involved in learning. Students are no longer satisfied with being passive listeners; they desire media that allows for action and reaction, such as pressing navigation buttons or answering quizzes with instant feedback. These interactive features are highly effective in increasing students' cognitive and emotional engagement, making the learning process more lively and less monotonous (Sipayung et al., 2025; Alwanda, 2025). This is in line with empirical evidence that Smart Apps Creator-based interactive media has high validity and practicality (scores >95%) because it provides students with the opportunity to interact directly with the material through devices, an experience rarely found in lecture methods (Saa'dah et al., 2025). However, this interactivity must be pedagogically designed, ensuring that each interaction aims to deepen understanding, not simply as a mere entertainment feature.

Data interpretation must also be closely linked to the cognitive developmental stage of elementary school students, who are in the concrete operational phase. At this stage, students' logical abilities begin to develop but are still highly dependent on concrete objects to understand cause-and-effect relationships in science and natural science phenomena. The high media needs score (4.58) reflects the need for a cognitive bridge that can be provided by digital simulation or visualization technology (Aisyah et al., 2025). The importance of a user-friendly interface is also a major highlight; digital platforms must be designed simply yet functionally to facilitate students' systematic thought processes from an early age (Lakilaki et al., 2025). Thus, the development of Smart Apps Creator (SAC)-based media is not merely a trend, but rather a pedagogical response to students' cognitive needs to manipulate learning objects virtually, thereby strengthening and lasting memory retention of science and natural science concepts.

From the perspective of user (teacher) readiness, the study results showed an average score of 4.28, indicating that teachers strongly approve of and require SAC-based media. This figure reflects teachers' high expectations for tools that can ease the teaching burden while improving the quality of material delivery. Smart Apps Creator (SAC) products are considered highly potential because they offer ease of operation without requiring complex programming skills, thus being deemed highly valid and practical by experts and practitioners (Sari & Erita, 2024). However, there is a critical gap between interest and competence. A needs analysis study confirmed that although teachers are enthusiastic, they are often hampered by a lack of technical skills, requiring intensive training and ongoing mentoring to prevent this technology from becoming mere display (Meliyani et al., 2022). Therefore, adoption of this media must be accompanied by a structured teacher professional development program.

The selection of Smart Apps Creator (SAC) as the basis for media development is supported by its user-friendly characteristics and compatibility with various devices, addressing the need for flexible media. SAC's ability to generate Android (APK) or HTML5 applications allows for wider distribution of materials and easy access to students outside of school hours. The high validity of SAC-based media

in various previous studies indicates that this platform can be relied upon to develop systematic and engaging teaching materials (Alwanda, 2025; Saa'dah et al., 2025). However, developers need to recognize that technology is only a tool; its effectiveness depends heavily on the quality of the content (material) included. Teacher training should not only focus on the technical aspects of "clicking and dragging" in applications, but also how to design effective instructional flows within them (Meliyani et al., 2022). Without strong pedagogical integration, even the most sophisticated media will fail to significantly improve student learning outcomes.

Despite high student preference for digital media (4.56), the reality on the ground shows disparities in facilities between schools and students (the digital divide). Dependence on devices and internet connections can be a serious obstacle to the equitable implementation of this media, especially in areas with limited infrastructure (Abidin et al., 2023; Rinaldi et al., 2025). Therefore, claims of the media's success must be placed in the context of schools with adequate support. Developers are advised to provide offline access features or lightweight versions of the media to mitigate these technical constraints, ensuring that this learning innovation is inclusive and does not widen the gap in educational quality between student groups.

The use of interactive learning media based on Smart Apps Creator in elementary school science learning shows strong potential and is relevant to current needs. This media is able to address the challenges of learning abstract concepts through contextual visualization, while accommodating the learning styles of the digital generation that demand interactivity (Khoirunisa et al., 2023; Etyarisky & Marsigit, 2022). Based on a comprehensive needs analysis, the development of this media is a strategic step to overcome learning boredom and improve conceptual understanding. However, its success is not automatic; it requires alignment between technological design, pedagogical content, and the readiness of the school ecosystem (teachers and infrastructure). Further research using experimental designs is highly recommended to test the effectiveness of this media on student learning outcomes in a more empirical and measurable manner (Jala, 2024).

This study acknowledges certain inherent constraints, most notably the restricted sample size and the confinement of participants to a specific geographical context, which consequently limits the broader generalizability of the findings. Furthermore, the reliance on questionnaires as the primary data acquisition instrument potentially constrains the depth of insight, particularly as this approach was not triangulated with qualitative observations or in-depth interviews. Additionally, the research scope is currently circumscribed to a needs analysis, thereby precluding an empirical evaluation of the planned digital instructional media's efficacy regarding student learning processes and outcomes. Accordingly, future research is recommended to incorporate a larger and more diverse demographic, employ a mixed-methods approach, and advance to the development and effectiveness testing phases. Such progression is essential to acquire a comprehensive understanding of the media's impact on science concept mastery, motivation, and learning engagement among elementary students.

4. Conclusion

This research underscores that the needs analysis of both educators and students constitutes a pivotal stage within the design framework of Smart Apps Creator-based Natural and Social Sciences instructional media for elementary education. The findings reveal a mutual necessity for instructional tools capable of presenting scientific concepts in a manner that is visually immersive, interactive, user-friendly, and aligned with learners' developmental characteristics. Specifically, educators prioritize media that offers practicality, flexibility, and robust support for the attainment of pedagogical objectives, conversely, students require engaging and participatory platforms that assist in concretizing abstract subject matter. Consequently, interactive media developed via Smart Apps Creator is posited to hold significant potential in addressing these distinct requirements, owing to its capacity to synthesize visual elements, interactivity, and accessibility within a single, adaptive platform.

These findings substantiate the premise that instructional media development is inextricably linked to user needs mapping, ensuring that the resulting tools remain contextually relevant and functionally viable within actual instructional practice. Furthermore, this study reaffirms that the successful implementation of digital media is not solely predicated on technological sophistication, but is critically dependent upon its alignment with teachers' pedagogical requirements and students' learning profiles. Consequently, the development of Smart Apps Creator-based Natural and Social Sciences media holds significant potential for enhancing instructional quality, provided it is grounded in empirical field needs and bolstered by adequate training and infrastructural support. Future research endeavors should be directed toward the development and empirical validation of this media, specifically examining its long-term impact on learning outcomes, student motivation, and academic engagement.

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