

Introducing Android-based Digital Learning Media Assisted by *iSpring Suite* in Science and Social Studies Learning in Elementary Schools

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ABSTRACT

This study examines the Implementation of Android-based digital learning media developed using iSpring Suite at MIN 3 Jember for IPAS learning in the fourth grade. The study aims to enhance students' understanding of abstract concepts through an interactive application integrating visual animations, quizzes, and curriculum-aligned learning materials. Despite the growing adoption of digital learning tools, there remains a gap in research on their effectiveness in improving conceptual understanding in elementary education. This study addresses that gap by evaluating the impact of an offline-accessible application designed to overcome challenges related to limited devices and unstable internet connections. This research used a qualitative approach with a case study design conducted at MIN 3 Jember, an Islamic school in East Java. The subjects were 30 fourth-grade students and an IPAS teacher. Data were collected through observation, interviews, documentation, and field studies. Observations focused on student interactions, learning media use, and responses. Interviews explored teachers' and students' experiences. Documentation included syllabi, lesson plans, and learning materials. Data were analyzed using Miles and Huberman's interactive model, involving data reduction, presentation, and conclusion verification through triangulation. The findings indicate that the application improves students' comprehension of abstract concepts like the water cycle while enhancing motivation and engagement. However, infrastructure limitations persist, necessitating better resources and teacher training. Overall, this study highlights the effectiveness of Android-based digital learning media in fostering engaging learning experiences and provides recommendations for educators and developers.

Keywords: digital learning media, iSpring suite, android application, IPAS, interactive learning.

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INTRODUCTION

The rapid development of digital technology has significantly impacted various sectors of life, including education. The era of digitalization raises new challenges and opportunities in the learning process, especially at the basic education level.¹ According to Serevina, the current generation is often referred to as digital natives, a generation that has been familiar with technology since birth.² Therefore, the education system in primary schools needs to adapt by integrating digital technology into the learning process to meet today's learners' needs.

One of the efforts that can be made is developing Android-based learning applications. Android is one of the most widely used mobile device operating systems worldwide, including in Indonesia. Data from We Are Social (2023) in Elida research shows that more than 80% of internet users in Indonesia use Android-based mobile devices. Thus, using Android-based applications can be an effective solution in supporting more interactive and fun learning.³

In Natural and Social Sciences (NSP) subjects, the use of digital learning media is very relevant. IPAS is a subject that demands an understanding of abstract concepts, such as the water cycle, environmental changes, and the history of human civilization. Research by Nasrullah shows that multimedia-based learning, which combines elements of text, images, audio, and video, can improve the understanding of abstract concepts more effectively than conventional learning methods.⁴ However, implementing digital media in IPAS learning in elementary schools still faces various obstacles, such as lack of access to appropriate media, low teacher competence in the use of technology, and the lack of applications specifically designed for IPAS learning needs.

This phenomenon is also reflected in several primary schools in Indonesia, including schools in rural areas. Based on a preliminary survey conducted in several elementary schools in the Jember area, it is known that most teachers still use the lecture method and textbooks as the leading media in teaching IPAS.⁵ This causes learning to be less interesting and tends to be monotonous. In addition, students often have difficulty understanding the material presented, especially concepts that require visualization and simulation.

Along with these challenges, some previous studies have tried to overcome this problem by developing technology-based learning media. For example, research conducted

¹ Ludfi A. Wardana et al., "Integration of Digital and Non-Digital Learning Media to Advance Life Skills of Elementary Education Students Post Pandemic Covid-19," *Pegem Egitim ve Ogretim Dergisi* 13, no. 1 (2022): 211–22, <https://doi.org/10.47750/pegegog.13.01.23>.

² Inayati Juwita Sari Vina Serevina, Sunaryo, Raihanati, I Made Astra, "Development of E-Module Based on Problem Based Learning (PBL) on Heat and Temperature to Improve Student's Science Process Skill," *TOJET: The Turkish Online Journal of Educational Technology* – 17, no. 3 (2018): 26–36.

³ Elida Elida, Febri Ananda, and Yolanda Intan Sari, "Use of Android Application-Based Learning Media Using PowerPoint and I-Spring Suite," no. Veic 2023 (2024): 1172–76, https://doi.org/10.2991/978-2-38476-198-2_166.

⁴ Anton Nasrullah Nasrullah et al., "Android-Based Mathematics Learning Media Assisted by Smart Apps Creator on Self-Regulated Learning Title," *International Journal of Asian Education* 3, no. 3 (2022): 160–65, <https://doi.org/10.46966/ijae.v3i3.292>.

⁵ Rahmania Rahman and Muhammad Fuad, "Implementasi Kurikulum Merdeka Belajar Dalam Pembelajaran Ipas Di Sekolah Dasar," *DISCOURSE: Indonesian Journal of Social Studies and Education* 1, no. 1 (2023): 75–80, <https://doi.org/10.69875/djosse.v1i1.103>.

by Fahmi Promise on the development of Android-based learning applications for science subjects showed that the use of this application can increase student learning motivation by 30%.⁶ Satiti et al. also revealed that the application of digital-based interactive media can improve student learning outcomes in social studies subjects by 25%.⁷ However, these two studies focused more on aspects of motivation and learning outcomes without paying special attention to the integration of more user-friendly application development technologies, such as iSpring Suite.

iSpring Suite is a learning content development software designed to produce interactive learning media quickly and easily. It supports various multimedia formats, such as videos, interactive quizzes, and simulations, accessed through Android devices. According to research by Pakpahan, using iSpring Suite in learning media development can save up to 40% of the time compared to conventional development methods.⁸ In addition, iSpring Suite also allows integration with other applications, such as Web2APK, to convert content into Android applications.

Despite the growing research on digital learning media, a significant gap remains in understanding how iSpring Suite can be effectively integrated into developing Android-based learning applications for IPAS subjects in elementary schools. Most prior studies have focused on content development or the general impact of digital media on learning outcomes. However, research specifically examining the role of development tools like iSpring Suite in enhancing digital learning experiences for IPAS remains limited.

This study addresses this gap by exploring how an Android-based learning application developed using iSpring Suite can improve the effectiveness of IPAS learning. iSpring Suite is particularly relevant due to its ability to create interactive, multimedia-rich learning content compatible with Android platforms. This research aims to demonstrate how digital learning applications can enhance student engagement, motivation, and comprehension in elementary education by leveraging its features.⁹

This study aims to evaluate the effectiveness of an Android-based digital learning application developed using iSpring Suite in enhancing IPAS learning in elementary schools. Additionally, it examines the application's impact on student motivation and learning outcomes while providing practical recommendations for teachers on integrating digital

⁶ Fahmi Romisa, "Pengembangan Media Pembelajaran Berbasis Android Menggunakan Ispring Suite Pada Mata Pelajaran Informatika Materi Perangkat Keras Komputer," *Jurnal Ilmiah Sains Teknologi Dan Informasi* 1, no. 2 (2023): 17–23, <https://doi.org/10.59024/jiti.v1i2.170>.

⁷ Wisnu Siwi Satiti, Nailu Ainil Bashiroh, and Fitri Umardiyah, "Development of Mobile-Learning Apps Using I-Spring-Suite Software for Relation and Function Material," *International Standard Book Number Conference Proceeding*, no. 11 (2023): 216–23.

⁸ Evri Sariati Pakpahan and Waminton Rajagukguk, "The Effect of Mobile Learning Media Based on Ispring Suite on Students' Learning Outcomes in Mathematics," *Formosa Journal of Multidisciplinary Research* 2, no. 1 (2023): 85–106, <https://doi.org/10.55927/fjmr.v2i1.2725>.

⁹ Haeriyah, Yuyu Yuhana, and Anwar Mutaqin, "Pengembangan E-Modul Interaktif Berbasis Android Menggunakan PowerPoint Dan Ispring Suite Pada Materi Lingkaran Kelas VIII SMP," *Proximal: Jurnal Penelitian Matematika Dan Pendidikan Matematika* 6, no. 2 (2023): 103–11, <https://doi.org/10.30605/proximal.v6i2.2567>.

technology into their teaching.¹⁰ The findings are expected to contribute practically by improving teaching strategies and student engagement and academically by addressing gaps in research on digital learning in elementary education, particularly in the context of IPAS subjects in Indonesia.

METHOD

This research used a qualitative approach with a case study design. The research focuses on implementing Android-based digital learning applications assisted by iSpring Suite on IPAS learning in class IV MIN 3 Jember. The research was conducted at MIN 3 Jember, an Islamic school in Jember Regency, East Java. The research subjects were fourth-grade students, totaling 30 people, and the IPAS subject teacher. The selection of this location was based on preliminary findings that IPAS learning in this school still faces various challenges, including the lack of use of digital learning media.

Data in this study were collected through several techniques, namely observation, interviews, documentation, and field studies. Observations were conducted to observe the IPAS learning process before and after using Android-based learning applications. Observations focused on student interactions, the use of learning media, and student responses to the application. Interviews were conducted with teachers and students to explore their experiences, perceptions, and responses to the application. Documentation includes data collection related to the syllabus, lesson plans, and learning materials used in the application implementation. Field studies were conducted to understand the learning context at MIN 3 Jember in more depth.

The collected data were analyzed using the interactive analysis model of Miles and Huberman in Sugiyono, which includes three main stages: data reduction, data presentation, and conclusion drawing and verification.¹¹ Data reduction was done by selecting, focusing, and simplifying data according to research needs. The reduced data was presented as descriptive narratives, tables, or diagrams to facilitate the conclusion. Initial conclusions obtained from data analysis were verified through triangulation of sources, methods, and time to ensure the validity and reliability of the findings. Specifically, classroom observations were compared with teacher interviews and student questionnaires to validate engagement and learning outcomes. Additionally, time triangulation was applied by collecting data at different points in the learning process to identify consistent patterns.

To further enhance validity, peer discussions and expert validation were conducted. Interrater agreement was used to minimize subjectivity to data interpretation, ensuring analysis consistency. The findings of this study are expected to offer new insights into the effectiveness of Android-based learning applications developed with iSpring Suite for IPAS

¹⁰ Moch. Rizal Fuadiy, M. Asep Fathur Rozi, and Siti Marpuah, "SEM Model to Assess the Impact of Mobile Gaming on Islamic Education Learning," *Journal of Educational Research and Practice* 2, no. 2 (July 26, 2024): 51–70, <https://doi.org/10.70376/jerp.v2i2.195>.

¹¹ Sugiyono, *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif, Dan R&D)* (Bandung: Alfabeta, 2013).

education. Additionally, they provide practical recommendations for teachers and learning media developers to optimize digital learning tools in elementary education.

DISCUSSION

Result

The digital learning media product developed based on Android, utilizing iSpring Suite, represents an innovation in education, particularly in MIN 3 Jember for the fourth-grade Integrated Science and Social Studies (IPAS) subject. This application is designed to help students understand abstract concepts in learning through interactive and multimedia approaches, leveraging technology already familiar to students' Android devices. This product's specifications involve using the iSpring Suite platform to develop learning materials that students can independently access through an Android-based application. iSpring Suite, as an authoring software, allows the creation of interactive materials such as slides, quizzes, simulations, and animations, which can be easily integrated into the learning application. By utilizing the features provided by iSpring Suite, this application enables students to learn visually and practically through simulations that depict various IPAS concepts, such as the water cycle and time division, as well as geographical and historical concepts related to Indonesia.

The digital learning media based on Android, developed with iSpring Suite, can significantly improve the quality of education at MIN 3 Jember. Through interactive features, visual animations, and quizzes that support active learning, students can more easily understand learning materials and become more motivated to study. This application also enables more independent learning, where students can learn at their own pace without waiting for turns in the classroom. Of course, the success of implementing this application depends significantly on the support from the school, teachers, and parents in facilitating the use of devices and ensuring the sustainability of digital learning in schools. With proper development and Implementation, this application has the potential to serve as a model for the development of other digital learning media in the future, which will enrich the learning experiences of students.

Through classroom observations and interviews conducted with teachers and students at MIN 3 Jember, it was noted that the application successfully integrates animations, simulations, and quizzes, making complex IPAS topics more accessible and engaging. For example, the animations depicting the water cycle dynamically illustrated the movement of water through evaporation, condensation, and precipitation. Teachers observed that students who had previously struggled to grasp these concepts through textbook explanations were able to describe the process in detail after interacting with the application.

Improved Student Comprehension

The integration of Android-based digital learning media, developed using iSpring Suite, has significantly improved students' comprehension of complex concepts in the Integrated Science and Social Studies (IPAS) subject at MIN 3 Jember. Through interactive features, such

as animations and simulations, abstract topics became more tangible and accessible to students.

For example, in learning about the water cycle, students interacted with animated visuals that dynamically depicted evaporation, condensation, and precipitation. Observations indicated that students who previously struggled with the concept through traditional textbook explanations could describe the process in detail after engaging with the application. As one teacher noted:

*"The animations simplify what textbooks struggle to convey, especially for students who are more visual learners."*¹²

Similarly, students reported that the application allowed them to grasp learning materials better. One student stated:

*"It is fun to use the app because I can see how things happen, like how the water changes from steam to rain."*¹³

This aligns with Mayer's theory of multimedia learning, which highlights that the integration of visual and verbal elements facilitates a more profound understanding. Teachers also observed that students asked more questions and engaged in discussions more actively after using the application.¹⁴

Furthermore, interactive quizzes embedded in the application encouraged self-assessment. Students could attempt quizzes multiple times, receiving immediate feedback, which reinforced learning and helped them understand their mistakes. One teacher remarked:

*"Students are more motivated to engage with the quizzes because they get immediate feedback, which helps them understand their mistakes and learn from them."*¹⁵

The ability to self-evaluate their understanding increased students' confidence and comprehension of the subject matter.

Increased Motivation and Enthusiasm for Learning

The use of the digital learning application also positively impacted student motivation and enthusiasm. Observations showed that before using the app, students were often passive learners, merely listening to teacher explanations¹⁶. However, after Implementation, they became more engaged, particularly in simulation activities and quizzes.

¹² Interview with Class IV Teacher at MIN 3 Jember on January 6, 2024

¹³ Interview with Class IV Teacher at MIN 3 Jember on January 6, 2024

¹⁴ Observation at Class IV Teacher at MIN 3 Jember on January 6, 2024

¹⁵ Interview with Class IV Teacher at MIN 3 Jember on January 6, 2024

¹⁶ Observation at Class IV Teacher at MIN 3 Jember on January 6, 2024

Students expressed enthusiasm for using the app, often likening it to playing a game. One student shared:

*"It feels like playing a game, but I am learning."*¹⁷

This gamification aspect helped bridge the gap between traditional and modern digital learning environments, making learning more enjoyable and stimulating. The application's quizzes, available in multiple-choice, short-answer, and essay formats, provided an element of challenge that motivated students to improve their scores through repeated attempts.



Figure 1. The Implementation of media based on Android

Additionally, integrating real-time assessments allowed teachers to track student progress efficiently. This feature enabled personalized learning, where students could focus on areas needing improvement, fostering a more self-directed approach to education.

Conformance to Curriculum

Interviews with teachers confirmed that the digital learning media aligns well with the fourth-grade IPAS curriculum. The structured content systematically covers essential topics such as biodiversity, the water cycle, time division, and historical aspects of Indonesia, ensuring that students receive a comprehensive education.

A teacher noted:

*"The content is perfectly aligned with our lesson plans. It helps us stay on track while making learning more engaging for the students."*¹⁸

The application's structured presentation follows the Technological Pedagogical Content Knowledge (TPACK) framework, which emphasizes integrating technology with pedagogy and curriculum standards. Furthermore, teachers found that iSpring Suite allowed them to customize learning content easily, making it more relevant and engaging for students. One teacher remarked:

¹⁷ Interview with Class IV Students at MIN 3 Jember on January 6, 2024

¹⁸ Interview with Class IV Teacher at MIN 3 Jember on January 7, 2024

*"This app is beneficial because students can directly see simulations of processes that were previously difficult for me to explain only with pictures in the textbook."*¹⁹

Analysis of lesson plans showed strong integration between learning objectives, student activities, and evaluation methods.

Obstacles and Challenges

Despite its advantages, the study also revealed obstacles in implementing the application. Observations and teacher interviews indicated that not all students had access to Android devices, leading to challenges in integrating the application effectively into the classroom. A teacher highlighted:

*"Not all students have smartphones, so we must schedule turns using shared devices. This sometimes disrupts the flow of the lesson."*²⁰

Table 1. Findings Result

Research Aspect	Findings	Data Source
Increased Student Participation	After using the app, students showed increased active participation, especially when using the interactive simulation and quiz features.	Class observation
Abstract Concept Understanding	The app helped students better understand abstract concepts such as the water cycle and environmental changes than the lecture method.	Interview with teacher
Student Enthusiasm	Students felt more interested in learning as the app provided interactive visuals and fun activities.	Interview with students
Ease of Use for Teachers	iSpring Suite allows teachers to customize learning content easily, making the material more relevant and engaging.	Interview with teacher, analysis of lesson plan documents
Student Motivation	The quiz and challenge features in the app increase students' motivation to learn.	Interview with students
Technical Constraints	- Not all students have Android devices. - An unstable internet connection is a challenge even though the app can be accessed offline.	Observation, interviews with teachers and students
Conformance to Curriculum	The materials in the app can be adapted to the IPAS curriculum and support the achievement of the designed learning objectives.	Syllabus and lesson plan document analysis

Teachers organized group learning sessions to address this, where students could share devices and collaborate on quizzes and simulations. Although the application was designed

¹⁹ Interview with Class IV Teacher at MIN 3 Jember on January 7, 2024

²⁰ Interview with Class IV Teacher at MIN 3 Jember on January 8, 2024

to function offline, occasional connectivity issues still posed a problem, particularly when downloading updates or accessing external resources. One teacher shared:

*"Some students struggle with updating the app because their homes have weak internet connections. We try to provide offline resources, but it's still a challenge."*²¹

Interviews also revealed that some teachers faced difficulties in maximizing the use of the app due to varying levels of digital literacy. Training programs were suggested to help teachers integrate digital learning tools more effectively. A teacher commented:

*"While I see the benefits of the app, I sometimes struggle with its technical aspects. A workshop or training session would be beneficial."*²²

These findings emphasize the need for better technological infrastructure and professional development opportunities for educators. Future improvements should focus on expanding access to devices, enhancing offline functionality, and providing training to maximize the app's impact on education. For more detail, you can see in the **Table 1** above.

Discussion

The results showed that the Implementation of Android-based learning applications assisted by iSpring Suite positively impacted IPAS learning in class IV MIN 3 Jember. This finding is in line with previous research, which states that using digital media can improve the quality of learning.²³ Some aspects of the discussion can be described as follows.

Improved Student Comprehension

The findings of this study underscore the transformative potential of interactive learning media in improving students' understanding of abstract concepts, particularly within the Integrated Science (IPAS) curriculum. One notable example is the enhanced comprehension of the water cycle, an abstract scientific process that students often struggle to visualize through traditional methods. By incorporating animations within the application, the water cycle process was effectively depicted in a visually engaging and dynamic manner. This aligns with Mayer's Cognitive Theory of Multimedia Learning, which posits that integrating verbal and visual elements in multimedia environments facilitates a deeper understanding of complex ideas.²⁴ The visual animations complemented textual explanations and enabled learners to construct mental models of the process, thus bridging the gap between abstract theory and tangible understanding.

²¹ Interview with Class IV Teacher at MIN 3 Jember on January 8, 2024

²² Interview with Class IV Teacher at MIN 3 Jember on January 8, 2024

²³ Yulianita Nursakinah, Eka Cahya Prima, and Rika Rafikah Agustin, "The Development of FunLABS Android-Based Application Using Unity Software as Learning Media to Explore Students' Motivation on Acid, Base, and Salt Topic," *Journal of Science Learning* 6, no. 2 (2023): 204–15, <https://doi.org/10.17509/jsl.v6i2.50447>.

²⁴ Harold L. Friedman, "The Singularities of the Integrals in Mayer's Ionic Solution Theory," *Molecular Physics* 2, no. 2 (1959): 190–205, <https://doi.org/10.1080/00268975900100171>.

This conclusion finds strong support in prior research. Atiqah demonstrated that instructional designs incorporating words and pictures enhance retention and comprehension by enabling dual-channel processing, a multimedia learning theory core concept. Their findings suggest that learners benefit from the simultaneous activation of auditory and visual processing pathways, reinforcing the dual coding of information.²⁵ Similarly, Satiti identified the efficacy of interactive simulations in fostering a nuanced grasp of scientific processes. Their study highlighted how simulations can clarify the interrelationships within complex systems, corroborating the results observed in this research.²⁶ The combination of animation and interactive features in the learning application echoes these principles, offering a robust framework for understanding complex scientific concepts.

Furthermore, the study revealed that the use of the application not only improved comprehension but also fostered increased student participation and collaboration. Observations indicated that students became more active during classroom discussions, frequently asking questions and engaging in group activities after interacting with the application. This behavioral shift signifies deeper cognitive engagement and reflects a transition from passive to active learning. According to Vygotsky's Social Constructivism Theory, social interactions are crucial in constructing meaningful knowledge. The theory highlights the importance of dialogue, collaborative problem-solving, and guided discovery as mechanisms through which learners internalize new concepts.²⁷ By providing interactive and collaborative learning opportunities, the application encouraged students to articulate their thoughts, negotiate meanings, and refine their understanding through peer discussions.

Moreover, the observed behavioral changes align with contemporary educational practices emphasizing active learning strategies to foster critical thinking and problem-solving skills. The ability of the application to stimulate inquiry-based learning is particularly noteworthy, as it encourages students to ask questions, explore scenarios, and test their hypotheses within a guided digital environment. This shift toward a student-centered approach reflects broader educational goals aimed at cultivating lifelong learners equipped to navigate complex, real-world challenges.

The results also suggest broader implications for curriculum design and instructional practices. The successful integration of interactive learning media underscores the need for educators to embrace digital tools that align with constructivist pedagogies. By enabling learners to interact with content dynamically, such tools enhance understanding and support the development of higher-order thinking skills. As demonstrated by this study, the thoughtful application of technology can bridge the gap between abstract academic content and students' lived experiences, making learning relevant and engaging. Future research

²⁵ Atiqah Meutia Hilda and Rizki Dwi Siswanto, "Android Application Development: Permutation of the Same Elements Based on Realistic Mathematics Education," *Mathematics Teaching-Research Journal* 13, no. 4 (2021): 170–80.

²⁶ Satiti, Bashiroh, and Umardiyah, "Development of Mobile-Learning Apps Using I-Spring-Suite Software for Relation and Function Material."

²⁷ Anne B. Smith, "Early Childhood Educare: Seeking a Theoretical Framework in Vygotsky's Work," *International Journal of Early Years Education* 1, no. 1 (1993): 47–62, <https://doi.org/10.1080/0966976930010105>.

could explore how similar interactive features might be applied to other abstract or interdisciplinary concepts, further validating their effectiveness in diverse educational contexts.

Increased Motivation and Enthusiasm for Learning

The study highlighted the significant impact of interactive learning media in enhancing comprehension and boosting students' motivation and enthusiasm for learning. The integration of interactive quizzes and immediate feedback mechanisms within the application created a dynamic and engaging learning environment. These features provided students with opportunities to actively participate in their learning process, allowing them to assess their progress instantly and adapt their strategies accordingly. Observational data revealed that students were not only excited to engage with the application but were also eager to repeat activities, reflecting a heightened enthusiasm for the subject matter.²⁸ This enthusiasm signifies a positive shift in learners' attitudes toward the learning experience, demonstrating the application's ability to transform education into an enjoyable and meaningful activity.

The findings align with Stevani's research, which underscores the capacity of interactive digital tools to enhance intrinsic motivation. By creating a stimulating and enjoyable experience, such tools can encourage students to engage deeply with the content. In this study, the application's design incorporated elements that catered to students' need for interaction and engagement, central to fostering intrinsic motivation. Keller's ARCS Model of Motivation further supports this perspective by emphasizing the importance of attention, relevance, confidence, and satisfaction in motivating learners.²⁹ The application addressed these components through its visually appealing design, alignment with students' learning goals, and immediate feedback mechanisms reinforcing a sense of achievement.

A testimonial from one of the students, who described learning with the application as enjoyable, further validates the motivational impact of the tool. This observation is consistent with findings by Franciscans, who demonstrated that including multimedia elements in educational settings significantly increases student engagement. Visuals, animations, and interactivity are particularly effective in capturing and maintaining students' attention, making the learning process more engaging and effective.³⁰ In this study, students showed sustained interest in the subject matter, which can be attributed to the strategic integration of these multimedia features.

The gamification aspect of the application also played a pivotal role in maintaining students' enthusiasm. By incorporating game-like elements such as point systems, interactive challenges, and instant rewards, the application tapped into motivational strategies identified

²⁸ Frank Senyo Loglo and Olaf Zawacki-Richter, "Learning with Digital Media: A Systematic Review of Students' Use in African Higher Education," *Journal of Learning for Development* 10, no. 1 (2023): 1–23, <https://doi.org/10.56059/jl4d.v10i1.857>.

²⁹ Jason Bond Huett et al., "Improving the Motivation and Retention of Online Students through the Use of Arcs-Based e-Mails," *International Journal of Phytoremediation* 21, no. 1 (2008): 159–76, <https://doi.org/10.1080/08923640802224451>.

³⁰ Fransisca Stevani and Imam Sucahyo, "Development of Android-Based Learning Media Using Microsoft Powerpoint Integrated Ispring Suite on Class X's Work and Energy Materials," *Prisma Sains : Jurnal Pengkajian Ilmu Dan Pembelajaran Matematika Dan IPA IKIP Mataram* 10, no. 3 (2022): 688, <https://doi.org/10.33394/j-ps.v10i3.5422>.

by bhakti. Gamification has been widely recognized as a practical approach to fostering engagement and maintaining students' interest over time. These elements give learners a sense of accomplishment and encourage them to strive for higher achievements, promoting sustained involvement in the learning process.³¹ In this context, the application effectively blended educational objectives with entertainment, creating a balanced approach that kept students motivated while ensuring that learning outcomes were achieved.

The heightened enthusiasm and motivation observed in this study also have broader implications for educational practices. First, they highlight the need for educators to integrate interactive and gamified tools into their teaching methodologies to create more dynamic and engaging classrooms. By leveraging the motivational power of technology, teachers can address common challenges associated with student disengagement and apathy.³² Furthermore, the findings suggest that such tools can be particularly beneficial in fostering a positive learning attitude among students who might otherwise struggle with traditional instructional methods.

This study illustrates the potential of interactive learning media to cater to diverse learning preferences. The combination of visual, auditory, and kinesthetic elements ensures that the application resonates with a wide range of learners, making the content more accessible and relatable. This adaptability is particularly important in accommodating different levels of prior knowledge and learning styles, ensuring that all students can benefit from the technology. Future research could explore the scalability of similar tools in more extensive and diverse educational contexts to evaluate their effectiveness in varying classroom dynamics.

Moreover, the motivational impact of interactive learning media extends beyond mere engagement to foster a deeper emotional connection with the learning process. By addressing students' psychological and cognitive needs, the application enhances academic performance and instills a sense of curiosity and a love for learning. As educational technology evolves, these findings underscore the importance of designing tools prioritizing motivation and engagement as central components of the learning experience. This study is a compelling example of how innovative approaches can transform traditional education, paving the way for a more interactive and enjoyable future for learners.

Conformance to Curriculum

A key finding of the study was the app's strong alignment with the Grade IV Integrated Science (IPAS) curriculum. The iSpring Suite-based application was meticulously designed to integrate seamlessly into the Learning Implementation Plan (RPP), ensuring that its content addressed the learning objectives, syllabus, and core competencies outlined in the curriculum. Teachers involved in the study attested to the app's ability to support lesson

³¹ Sektalonir Oscarini Wati Bhakti et al., "The Development of E-Pocket Book Based on iSpring Suite 11 Software," *English Educational Journal* 15, no. 3 (2024): 170–82.

³² Joko Pamungkas, Suminto A. Suyuti, and Arif Rohman, "Character Value That Formed through Learning the Art of Playing GACIL in Early Childhood," *Cypriot Journal of Educational Sciences* 16, no. 4 (2021): 1503–16, <https://doi.org/10.18844/cjes.v16i4.6004>.

delivery effectively, emphasizing that it provided a structured and targeted approach to achieving the desired educational outcomes.

This seamless integration is a practical demonstration of the Technological Pedagogical Content Knowledge (TPACK) framework proposed by Mishra and Koehler (2006). The TPACK framework highlights the importance of aligning technological tools with both pedagogical strategies and content standards to maximize their educational impact.³³ By adhering to this principle, the application met curriculum requirements and enriched the teaching and learning process. The incorporation of digital media, interactive elements, and curriculum-aligned content allowed educators to present complex concepts in ways that were engaging and accessible for students.

The study's findings align with broader research emphasizing the importance of technology's alignment with curriculum objectives. For example, Bryant found that digital learning tools designed following educational standards enhance student learning outcomes by providing a cohesive and systematic instructional experience.³⁴ This research supports the notion that technology's effectiveness in education is not solely determined by its novelty or functionality but also by its relevance and alignment with the broader educational framework.

The documentation of lesson plans and syllabi further substantiated the application's ability to support systematic planning and Implementation. These records provided clear evidence that the app content was designed to complement the existing curriculum rather than introduce disconnected or irrelevant material. Teachers reported that the app served as a reliable teaching aid, helping them achieve learning objectives more efficiently while maintaining the integrity of the curriculum. The app addressed various learning needs by integrating multimedia resources and interactive activities, catering to students with diverse learning preferences and abilities.

Moreover, the study demonstrated the potential of such technology to elevate educational standards by bridging the gap between theoretical knowledge and practical application. For instance, the app's alignment with the curriculum ensured that students could engage with content that directly supported their academic development while fostering critical thinking and problem-solving skills. The app's interactive features allowed for the exploration of scientific concepts in ways that traditional textbooks and lectures could not, making the learning process more engaging and meaningful for students.

The alignment with the curriculum also has broader implications for educational practice. First, it highlights the need for educational technology developers to collaborate closely with educators and curriculum designers. This collaboration ensures that digital tools are innovative, pedagogically sound, and relevant to the students' learning journey. Second, it underscores the importance of professional development for teachers in effectively

³³ Kristin C. Scott and Kim Nimon, "Construct Validity of Data from a TPACK Self-Assessment Instrument in 2-Year Public College Faculty in the United States," *Journal of Research on Technology in Education* 53, no. 4 (2020): 427–45, <https://doi.org/10.1080/15391523.2020.1790444>.

³⁴ Refni Aryanti, "Development of Interactive Multimedia Using Powerpoint Applications Combined With Ispring Suite Application," *Proceedings of the Sixth Padang International Conference On Economics Education, Economics Business and Management, Accounting and Entrepreneurship (PICEEBA 2020)* 179, no. Piceeba 2020 (2020): 325–30.

integrating technology into their lesson plans. While the app itself is designed to align with the curriculum, its impact depends on how well teachers can incorporate it into their instructional strategies.

Additionally, the study illustrates how the app's design supports not only students' cognitive development but also teachers' professional efficiency. By providing ready-to-use, curriculum-aligned materials, the app reduces the burden on educators to create supplementary resources, allowing them to focus more on personalized teaching and student engagement. This aspect is particularly significant when teachers face time constraints or lack access to high-quality teaching materials.

The successful Implementation of the iSpring Suite-based application also speaks to the broader potential of digital technology in transforming education. By aligning with curriculum standards, such tools ensure that technology becomes an integral part of the teaching and learning process rather than a supplementary or optional component.³⁵ This integration fosters a more cohesive educational experience where technology supports rather than disrupts traditional instructional methods. Future research could explore the scalability of such applications across different subjects and grade levels to further validate their efficacy in diverse educational settings.

The study underscores the importance of curriculum alignment in designing and implementing educational technology. The iSpring Suite-based application is an exemplary model of how digital tools can enhance learning outcomes by adhering to established pedagogical frameworks and curriculum standards. By bridging the gap between traditional and digital teaching methods, the app facilitates effective learning and paves the way for a more integrated and forward-thinking approach to education. This alignment, supported by theoretical frameworks like TPACK and empirical research, highlights the transformative potential of digital tools in elevating educational standards and fostering a more engaging, efficient, and meaningful learning environment.³⁶

Obstacles and Challenges

However, the study also revealed obstacles in implementing the application in the field. One of the main challenges is the limited number of Android devices owned by students, which hinders the app's accessibility. In addition, the problem of unstable internet connection is also an obstacle for schools that want to integrate technology into learning. Nonetheless, the app has been designed to function offline, allowing students to still access most of the material without needing an internet connection. This feature shows the developer's effort to mitigate the technical constraints.

These constraints reflect the importance of improving the primary school's technological infrastructure, such as providing adequate learning devices and a stable

³⁵ Gemintang Cinta Winarko, "Project-Based Learning with Scratch to Improve Students' Creative Thinking Ability: Systematic Literature Review," *Griya Journal of Mathematics Education and Application* 4, no. 2 (2024): 190–96, <https://doi.org/10.29303/griya.v4i2.440>.

³⁶ Scott and Nimon, "Construct Validity of Data from a TPACK Self-Assessment Instrument in 2-Year Public College Faculty in the United States."

internet network.³⁷ With better infrastructure support, this iSpring Suite-based digital learning application has the potential to significantly improve the quality of education, especially in supporting innovative and relevant curriculum-based learning. This research makes an important contribution to filling the gap of previous research, especially in integrating iSpring Suite for the development of Android-based learning applications.

In addition, the results of this research also provide practical guidance for teachers in utilizing technology to improve the quality of learning. Thus, this research is relevant in the academic context and provides a significant practical impact on the world of education, particularly in improving the effectiveness of IPAS learning in elementary schools. The results of this study underscore the transformative potential of application-based interactive learning media in education. By enhancing comprehension, increasing motivation, and aligning with curriculum standards, such tools address critical challenges in traditional teaching methods.³⁸ The improved understanding of the water cycle observed in this study is indicative of the broader applicability of multimedia tools in teaching other abstract scientific concepts. Future research could explore the impact of similar tools in other subject areas, such as mathematics or social sciences, to further validate these findings.

Students' heightened enthusiasm and motivation point to the importance of incorporating interactive features in educational applications. Developers should consider integrating gamification, real-time feedback, and adaptive learning pathways to sustain students' interests and cater to individual learning paces. The success of the iSpring Suite-based application in aligning with curriculum standards highlights the need for collaboration between educators and developers.

Educational tools should be designed with input from teachers to ensure they meet pedagogical requirements and support learning objectives.³⁹ While the study demonstrated positive outcomes, addressing potential challenges, such as the digital divide and varying levels of technological proficiency among teachers and students, is essential. Providing professional development for teachers and ensuring equitable access to technology are critical steps in maximizing the benefits of digital learning tools.⁴⁰ This study reaffirms the significant impact of application-based interactive learning media on education. By improving comprehension, increasing motivation, and adhering to curriculum standards, such tools offer a comprehensive solution to modern educational challenges. As technology continues to evolve, its integration into education must be guided by evidence-based practices and a commitment to enhancing learning outcomes for all students. Future research should

³⁷ Loglo and Zawacki-Richter, "Learning with Digital Media: A Systematic Review of Students' Use in African Higher Education."

³⁸ Nur Ainiyah et al., "Development of Learning Media with Power Point Application Based on iSpring Suite 11 in Arabic Language Learning," *Jurnal Al Bayan: Jurnal Jurusan Pendidikan Bahasa Arab* 16, no. 1 (2024): 150, <https://doi.org/10.24042/albayan.v16i1.20699>.

³⁹ John Carlo Maturan et al., "Assessing Student Satisfaction with Student Leaders' Performance," *Journal of Educational Research and Practice (JERP)* 2, no. 3 (November 4, 2024): 1–20, <https://doi.org/10.70376/jerp.v2i3.204>.

⁴⁰ Y. Rahmawati et al., "The Integration of STEAM-Project-Based Learning to Train Students Critical Thinking Skills in Science Learning through Electrical Bell Project," *Journal of Physics: Conference Series* 2098, no. 1 (2021), <https://doi.org/10.1088/1742-6596/2098/1/012040>.

investigate the long-term effects of interactive learning media and explore innovative ways to overcome existing challenges, ensuring that technology is an enabler of equitable and practical education.

CONCLUSION

In conclusion, implementing Android-based digital learning media using iSpring Suite has positively impacted student engagement, understanding, and motivation in learning IPAS concepts at MIN 3 Jember. The use of interactive features, animations, and offline accessibility has enhanced the learning experience while overcoming some technical limitations. The implications of this study suggest that integrating digital learning tools in the classroom can significantly improve educational outcomes, particularly in making abstract concepts more accessible. However, it is recommended that schools invest in further infrastructure improvements, such as providing adequate devices and ensuring stable internet connectivity, to optimize the benefits of digital learning fully. Additionally, continuous training for teachers to effectively integrate such technology into their teaching methods is essential for maximizing its potential.

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