

EFFECTIVENESS OF DIGITAL MEDIA IN SUPPORTING STUDENT-CENTERED LEARNING IN ELEMENTARY SCHOOL SCIENCE AND SOCIAL STUDIES (IPAS): A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

This study is motivated by the shift from Teacher-Centered Learning (TCL) to Student-Centered Learning (SCL) in the digital era, particularly in Integrated Science and Social Studies (IPAS) learning at the elementary school level. The study aims to analyze the effectiveness of digital learning media in supporting the implementation of SCL in IPAS learning in elementary schools. The research employed a Systematic Literature Review (SLR) method using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) stages. Data were collected through article searches in Google Scholar, SINTA, and GARUDA databases with publication years ranging from 2020 to 2025. Of the 30 identified articles, 10 were selected for in-depth analysis based on the inclusion and exclusion criteria. The findings indicate that digital media such as interactive multimedia, Quizizz, Kahoot, Liveworksheet, Google Sites, and Interactive Flat Panel (IFP) are effective in improving students' motivation to learn, active engagement, critical thinking skills, and understanding of IPAS concepts in elementary schools. Digital media also support the creation of more interactive, collaborative, contextual, and student-centered learning environments. However, the implementation of digital media still faces several challenges, including limited technological infrastructure, low teacher digital literacy, and the potential for digital fatigue among students. The novelty of this study lies in the comprehensive synthesis of various interactive digital media in supporting Student-Centered Learning in elementary school IPAS instruction, as well as the development of the conceptual framework entitled "Strategic Digital SCL Framework for IPAS Learning," which integrates technological infrastructure, teacher competence, digital media, SCL activities, and student outcomes. This study contributes to the body of knowledge by providing a comprehensive framework for integrating digital media into Student-Centered Learning (SCL) in elementary school IPAS instruction.

Keywords: Digital Learning Media, Student-Centered, IPAS, Elementary School, SLR.

INTRODUCTION

The world of education is currently undergoing an extraordinary transformation. The emergence of the Industrial Revolution 4.0 and Society 5.0 has changed the foundation of how knowledge is created, distributed, and consumed. This transformation affects all levels of education, from elementary schools to higher education institutions. In the context of elementary schools, this transformation demands a shift from traditional contextual learning models or teacher-centered learning toward more dynamic and personalized Student-Centered Learning (SCL). SCL is a learning approach that places students at the center of education, rather than merely as recipients of knowledge from teachers. SCL aims to enable students to

understand learning materials effectively and develop their abilities independently and optimally (Putri C. A., 2023). In SCL, teachers act as facilitators and mentors who guide students in maximizing their potential independently.

Education is no longer merely a one-way process of transferring information, but rather an active process that involves individuals in constructing their understanding of the environment through experiences, interactions, and the use of both traditional and digital learning media provided by teachers. Digital learning media are used not only as instructional aids but also as systems that involve interactions among humans (teachers, students, and parents), technology, content, and the learning environment, all of which enable the optimal implementation of SCL.

At the elementary school level, the transition from concrete operational thinking to abstract thinking requires a strong bridge of interaction and interactivity, which is currently provided by digital technology. SCL positions students as the main actors who have freedom in the learning process. Students are encouraged to explore, ask questions, and solve challenges. The teacher's role as a facilitator is crucial in creating a stimulating learning environment. However, the implementation of SCL at the elementary level is often limited by constraints in physical learning resources and significant variations in students' learning speeds.

Digital learning media offer solutions to these challenges through features that teachers can customize independently. Through digital technology, students can learn at their own pace (self-paced learning), access materials that align with their personal interests, and receive immediate feedback. This approach is consistent with the constructivist theories proposed by Piaget and Vygotsky, which emphasize the importance of active involvement and social interaction, including through digital platforms, in the construction of cognitive structures. This is supported by Salsabila and Agustian (2021), who stated that technology in learning facilitates active and collaborative interactions that help students construct meaning in more easily understood contexts.

Elementary school is one of the basic levels of education that introduces students to theories and simple concepts relevant to their daily lives. The integration of science and social studies into IPAS in the Merdeka Curriculum aims to help students understand natural and social phenomena holistically. IPAS requires students to master process skills such as observing, questioning, predicting, forecasting, and presenting results. IPAS materials often involve abstract concepts or phenomena that cannot be directly observed in the classroom, such as the solar system, photosynthesis, or historical events. Therefore, the role of digital media has

become increasingly crucial. Without adequate media, learning IPAS in elementary schools may become mere memorization of boring texts, which can eventually diminish students' curiosity.

The use of digital learning media to support SCL, especially in IPAS subjects, is highly necessary. Digital media such as interactive simulations, Virtual Reality (VR), Augmented Reality (AR), and animated educational videos function as cognitive bridges. In IPAS learning, AR can display three-dimensional human organs directly in front of students or provide digital simulations that allow students to experiment with simple electrical circuits. Literature studies have shown that interactive digital media can improve students' memory retention. When students engage in educational games or simulations, they enter a state of flow in which their focus reaches its highest level because the learning process feels enjoyable and challenging.

Based on these considerations, this literature review is important for illustrating the extent to which various types of digital media effectively support SCL in IPAS learning at the elementary school level. By gathering findings from previous studies, patterns of success and failure can be analyzed. For example, whether game-based learning approaches are more effective for social studies materials or whether virtual laboratory simulations are more suitable for science learning. The purpose of this study is to provide both theoretical and practical foundations for educators and policymakers. The main focus of this research is to investigate how digital media can stimulate Higher Order Thinking Skills (HOTS) and collaboration among students within the context of Student-Centered Learning.

The main focuses of this literature review are: (1) identifying types of digital media that are effective in supporting the SCL model in IPAS subjects at the elementary school level; (2) examining the role of digital media in facilitating students' science and social process skills; and (3) analyzing the challenges and solutions in implementing SCL-based learning media in elementary schools. Through this comprehensive literature review, teachers are expected to gain a practical framework for transforming classrooms into student-centered learning environments aligned with curriculum demands.

Previous studies have extensively discussed the use of digital media in learning; however, most of them focused only on the effectiveness of a single type of digital media, such as Quizizz, Kahoot, animated videos, Virtual Reality (VR), or Augmented Reality (AR), without comprehensively comparing their respective roles in supporting Student Centered Learning (SCL) (Salsabila & Agustian, 2021). Several studies also mainly emphasized learning outcomes and student motivation. In contrast, aspects such as critical thinking skills, collaborative interaction, independent learning, inquiry skills, and Higher Order Thinking Skills (HOTS) in the context of IPAS learning at the elementary school level have not been comprehensively

synthesized. In addition, previous studies tended to examine digital learning media in general subjects. In contrast, research specifically discussing the integration of digital media in IPAS learning within the Merdeka Curriculum context remains limited.

Existing studies also rarely analyze the relationships among digital media, teacher competence, technological infrastructure, and Student-Centered Learning activities within an integrated learning ecosystem. Most previous studies were conducted on a small scale and focused solely on short-term implementation, thereby limiting the generalizability of the findings. Furthermore, there is still limited literature that synthesizes multiple digital media to identify which media types are most effective in supporting different dimensions of Student-Centered Learning in IPAS instruction, such as conceptual understanding, collaboration, motivation, and inquiry-based learning activities.

Therefore, this study seeks to address these gaps by providing a comprehensive synthesis of interactive digital media, analyzing their effectiveness, challenges, and implementation strategies to support SCL-based IPAS learning at the elementary school level. This study also proposes a conceptual framework that holistically integrates technology infrastructure, teacher competence, digital media, student-centered learning activities, and student learning outcomes.

LITERATURE REVIEW

Digital Learning Media

Learning media are tools used to support the teaching and learning process. These tools function as media for delivering information from the communicator (teacher) to the communicant (students) (Sahib, 2023). This differs slightly from the view expressed by Hasan (2021), who states that learning media function as intermediaries for conveying information from teachers to students. Their purpose is to stimulate students' motivation so that they can engage in learning activities more comprehensively and meaningfully.

Various learning media concepts that use different media types help create active, dynamic, and interactive learning environments for both students and teachers. Learning media aim to provide facilities that help students understand learning materials more effectively. In addition, learning media can present information in more engaging ways, thereby increasing students' motivation to learn. The concept of learning media also includes integrating modern technologies, such as software applications, learning simulations, and online learning platforms, to support technology-based learning activities.

The implementation of learning media integrated with modern technologies has a significant impact on classroom learning activities. As stated by Rofiq, Mahadewi, and Parmiti

(2019) in Hidayat et al. (2024), the use of learning media is not only intended to complete learning stages or attract students' interest but also to make learning easier and more effective. Therefore, by properly planning, producing, and implementing learning media, teachers can create learning experiences that are more engaging, interactive, and efficient for students.

Student-Centered Learning (SCL)

Student-Centered Learning (SCL) is a learning approach that positions students, individually or in groups, as the main subjects in the learning process. In this approach, teachers act as facilitators or mentors during learning activities. Rogers (1983) in Wati & Sugesti (2025) explains that student-centered learning is an approach that provides students with opportunities to independently construct the subjects they wish to learn, including the methods and reasons why the learning is valuable to them.

In Student-Centered Learning (SCL), teachers must recognize the needs and characteristics of each student so that teaching methods and strategies can be adjusted according to their abilities and interests, thereby motivating students to participate actively. According to Medriati & Risdianto (2020), several strategies can be applied, including building positive relationships with students by creating a friendly and supportive learning environment, providing freedom and support in choosing learning themes and methods, offering relevant learning resources such as media, textbooks, online materials, and experimental tools, and encouraging students to think critically and creatively through tasks and challenges that require problem-solving and innovation. Teachers also play an important role in giving constructive feedback to help students develop ideas, foster creativity, and collaborate effectively in the learning process.

METHODOLOGY

This study employed a qualitative approach using the Systematic Literature Review (SLR) method to examine the use of digital media in supporting Student-Centered Learning (SCL) in IPAS learning at the elementary school level. The article selection process was conducted using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) stages, which consist of identification, screening, eligibility, and inclusion.

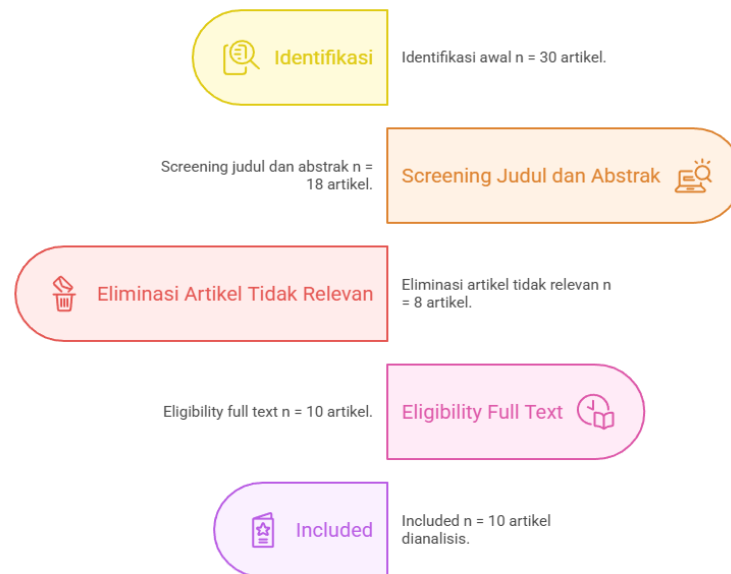


Figure 1. PRISMA-Based Research Stages

In the identification stage, 30 articles were obtained from the Google Scholar, SINTA, and GARUDA databases using the keywords “digital learning media,” “Student-Centered Learning,” and “elementary school IPAS.” Subsequently, a screening process was conducted based on the relevance of the titles and abstracts, resulting in 18 remaining articles. The eligibility stage was conducted by thoroughly reading the full text of each article against the inclusion and exclusion criteria. Articles that were not relevant to IPAS learning, did not discuss digital media, or did not focus on the elementary school level were excluded. As a result, 10 articles met the criteria and were selected for further analysis. The selected articles obtained through the PRISMA selection process are presented as follows:

Table 1. Article Selection Results Using the PRISMA Stages

RESEARCHER	YEAR	TITLE	DIGITAL LEARNING MEDIA
Alifia Edria Adikasari	2025	Inovasi Media <i>Flashcard Wayground</i> untuk Meningkatkan Keterlibatan Siswa pada Pembelajaran IPAS di Sekolah Dasar	<i>Flashcard Wayground</i> berbasis platform <i>Quizizz</i>
Wilis Eka Sulistyorini, Dkk	2025	Implementasi Penggunaan Media Pembelajaran Interaktif Berbasis Digital Terhadap Hasil Belajar IPA Pada Materi Peredaran Darah Manusia	Animasi, video, simulasi digital, dan aplikasi Android
Fadillah Ramadanti	2025	Implementasi Media Pembelajaran Digital Untuk Meningkatkan Pemahaman Materi IPAS Di Kelas IV Mis Maura El-Mumtaz Binjai Selatan	Video Animasi, <i>PowerPoint</i> Presentasi, Gambar ilustrasi digital
Acih Trisnawati, Maman Suryaman	2025	Implementasi Pembelajaran Berbasis Digital Menggunakan Liveworksheet	Lembar kerja interaktif berbasis web (<i>e-worksheet</i>)

Hikmah Hafidza, Dkk	2025	Pada Mata Pelajaran IPAS Kelas VI (Enam) SDN Sirnabaya I Analisis Awal Pembelajaran IPAS Di Kelas IV: Kebutuhan Media Pembelajaran Yang Kontekstual Dan Menyenangkan	Game Edukatif
Nunik Budiyantri, Ratna Diah Utami	2024	Meningkatkan Kemampuan Bernalar Kritis Melalui Model Pembelajaran <i>Project Based Learning</i> Berbantuan Media Digital	Video Pembelajaran dari YouTube, PhET Interactive Simulations, Wordwall
Pradika Alim Zulemil, Fikhen Tri Wulandari	2025	Pengembangan Media Pembelajaran Interaktif Berbasis Web Melalui Google Sites Pada Pembelajaran IPAS Di Kelas IV Sekolah Dasar	Google Sites
Vinka Rise Lestari, Dkk	2025	Pengembangan Media Digital ABTAYA Berbasis E-book Interaktif sebagai Media Pembelajaran IPA Materi Tata Surya di Kelas VI SD	E-Book Interaktif
Komang Echa Yunita Pramesti, Dkk	2025	Komik Digital Berbasis Masalah sebagai Media Pembelajaran IPAS Materi Sistem Pernapasan Manusia Kelas V SD	Komik digital berbasis masalah
Lia Rohaniya, Dkk	2025	Pengembangan Media <i>Flipbook</i> Digital Pada Materi Indonesiaku Kaya Raya Kelas V SD	Flipbook Digital

DISCUSSION

The search results from Google Scholar, SINTA, and GARUDA identified 30 articles relevant to the research keywords. Subsequently, a screening process was conducted based on the titles, abstracts, and the relevance of the article contents to the research focus, resulting in 10 articles that met the criteria for further analysis. These articles discussed various types of digital learning media used to support Student-Centered Learning (SCL) in IPAS instruction at the elementary school level. The synthesis results from the 10 articles that discuss digital media as learning support tools are described below.

Table 2. Synthesis of Digital Learning Media Supporting Student-Centered Learning in IPAS Instruction at the Elementary School Level

Digital Media Types	Effectiveness In Scl	Advantages	Challenges
Interactive Multimedia	Improves conceptual understanding and student engagement	Makes learning materials more concrete and interactive through visualization	Requires devices and internet access

Quizizz And Kahoot	Increases students' motivation and active participation	Provides instant feedback and creates an enjoyable learning atmosphere	Dependent on internet connectivity
Animated Videos	Helps students understand abstract concepts	Learning materials become more attractive and easier to understand	Student interaction is still limited
Liveworksheet	Supports independent learning	Practical and easily accessible	Requires teachers' digital literacy
Google Sites	Supports flexible and collaborative learning	Learning materials are integrated into a single platform	Requires technical skills
Interactive E-Books	Increases students' interest in learning	Materials are more interactive	Limited by the availability of devices
Digital Comics	Supports contextual learning	Highly engaging for elementary school students	The development process is relatively time-consuming
Interactive Flat Panel (IFP)	Enhances student interaction and learning focus	Supports visual, audio, and kinesthetic learning activities	Device costs are relatively high

Based on the results of the literature synthesis, interactive digital media are highly effective in supporting Student-Centered Learning (SCL) in IPAS instruction at the elementary school level. This effectiveness is reflected not only in improved student learning outcomes but also in increased active participation, intrinsic motivation, critical thinking skills, and collaborative interaction among students. These findings are consistent with previous studies, which reported that digital learning environments encourage students to become more actively involved in constructing knowledge through exploration and interaction (Hwang & Chien, 2022). Several studies also revealed that technology-supported learning environments can improve students' engagement and autonomy in elementary education contexts (Limniou et al., 2022; Pan et al., 2023).

The effectiveness of digital media in supporting SCL can be explained through Piaget's constructivist theory and Vygotsky's social constructivist theory. Piaget emphasized that students construct knowledge through direct experience, while Vygotsky highlighted the importance of social interaction in cognitive development. Interactive digital media such as multimedia, Quizizz, Kahoot, and Interactive Flat Panel (IFP) provide learning environments that enable students to explore IPAS concepts both independently and collaboratively. This finding aligns with previous literature stating that digital learning media facilitate collaborative

learning, peer interaction, and active knowledge construction, which are essential characteristics of Student-Centered Learning (Neo & Neo, 2009).

Furthermore, the effectiveness of digital media can be analyzed through Media Richness Theory (MRT), which posits that media with high interactivity are more effective at conveying complex information. In IPAS learning, interactive digital media can transform abstract concepts such as the solar system, human organ systems, and social phenomena into more concrete and visual representations that are easier for elementary school students to understand. Previous studies similarly found that multimedia-based learning improves conceptual understanding because students can simultaneously process visual, auditory, and interactive information (Mayer, 2021; Hwang & Chien, 2022).

The synthesis results indicate that gamification-based digital media, such as Quizizz and Kahoot, are more effective at increasing students' motivation to learn and active participation. This result supports previous research emphasizing that game-based learning elements, including points, leaderboards, and instant feedback, positively influence students' enthusiasm and classroom engagement (Deterding et al., 2011; Pan et al., 2023). In contrast, interactive visual media such as multimedia and Interactive Flat Panels are more effective at improving conceptual understanding and critical thinking skills because they provide opportunities for visualization, simulation, and inquiry-based learning activities.

However, previous studies still have several limitations. Most studies focused on a single type of digital media and did not comprehensively examine the relationships among digital media, teacher competence, Student-Centered Learning activities, and student outcomes (Limniou et al., 2022; Pan et al., 2023). In addition, several studies were conducted on a small scale, which limits the generalizability of the findings. Some previous studies also emphasized learning outcomes without discussing the pedagogical process underlying successful SCL implementation. Therefore, this study seeks to address this research gap by synthesizing digital media to support SCL-based IPAS learning at the elementary school level.

This study proposes a conceptual model, titled the "Strategic Digital SCL Framework for IPAS Learning," as the novelty of the research. The model explains that the successful implementation of digital media in Student-Centered Learning-based IPAS instruction is influenced by five main components: technology infrastructure, teacher competence, interactive digital media, Student-Centered Learning activities, and student outcomes. This model

demonstrates that digital media do not function in isolation but rather become part of an integrated digital learning ecosystem that involves technology readiness, teachers' pedagogical competence, active learning activities, and student learning achievement. The proposed framework also strengthens previous literature by providing a more holistic understanding of how digital media can effectively support SCL implementation in elementary school IPAS learning contexts.

CONCLUSION

Based on the results of the Systematic Literature Review, interactive digital media are effective in supporting Student-Centered Learning (SCL) in IPAS instruction at the elementary school level. This effectiveness is reflected in improvements in students' motivation to learn, active participation, critical thinking skills, and conceptual understanding through more interactive, contextual, and collaborative learning processes. The effectiveness of digital media is influenced by the level of media interactivity, teachers' digital competence, and the support of school technology infrastructure.

The synthesis results also indicate that gamification-based media are more effective in increasing students' motivation to learn. In contrast, interactive visual media are more effective at strengthening students' understanding of abstract concepts in IPAS learning. This study introduces the "Strategic Digital SCL Framework for IPAS Learning," which integrates technology infrastructure, teacher competence, digital media, SCL activities, and student outcomes as a conceptual framework for implementing digitally based IPAS learning in elementary schools.

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