ANALYSIS OF THE IMPACT OF THE LEARNING DIGITALIZATION PROGRAM THROUGH THE DISTRIBUTION OF INTERACTIVE FLAT PANELS IN ELEMENTARY SCHOOLS

Uki Adi Prasetiya[1], A. A. Gim. N[2]
[1, 2]UIN K.H. Abdurrahman Wahid Pekalongan
ukiadiprasetiya800@gmail.com[1], aagynastiar@gmail.com[2]

ABSTRAK

Program digitalisasi pembelajaran merupakan salah satu upaya strategis pemerintah dalam meningkatkan kualitas pendidikan dasar melalui pemanfaatan teknologi pembelajaran. Salah satu bentuk implementasi program tersebut adalah distribusi Interactive Flat Panel (IFP) ke sekolah dasar. Penelitian ini bertujuan untuk menganalisis dampak program digitalisasi pembelajaran melalui distribusi Interactive Flat Panel di SDN 03 Sukorejo Kabupaten Pemalang. Penelitian ini menggunakan pendekatan kualitatif dengan jenis penelitian lapangan *(field research)*. Sumber data penelitian meliputi guru dan siswa, sedangkan teknik pengumpulan data dilakukan melalui observasi, wawancara, dan dokumentasi. Analisis data menggunakan model Miles dan Huberman yang meliputi tahap pengumpulan data, reduksi data, penyajian data, serta penarikan kesimpulan. Hasil penelitian menunjukkan bahwa pemanfaatan Interactive Flat Panel memberikan dampak positif terhadap proses pembelajaran, khususnya dalam meningkatkan variasi metode dan media pembelajaran, memperkuat interaksi guru dan siswa, serta meningkatkan motivasi dan keterlibatan siswa dalam pembelajaran. Selain itu, program ini juga mendorong peningkatan kompetensi digital guru, meskipun masih terdapat kendala berupa keterbatasan literasi digital, infrastruktur teknologi, serta sistem pemeliharaan perangkat. Penelitian ini berkontribusi dalam memberikan gambaran empiris mengenai implementasi dan dampak program digitalisasi pembelajaran di sekolah dasar, serta menjadi bahan pertimbangan bagi sekolah dan pemerintah dalam mengoptimalkan pemanfaatan teknologi pembelajaran.

Kata kunci *:* digitalisasi pembelajaran, interactive flat panel, sekolah dasar, pembelajaran digital, kompetensi guru

ABSTRACT

Learning digitalization programs represent one of the government's strategic efforts to improve the quality of primary education through the integration of educational technology. One form of this initiative is the distribution of Interactive Flat Panels (IFP) to elementary schools. This study aims to analyze the impact of the learning digitalization program through the distribution of Interactive Flat Panels at SDN 03 Sukorejo Kabupaten Pemalang. This research employed a qualitative approach using a field research design. The data sources consisted of teachers and students, while data collection techniques included observation, interviews, and documentation. Data analysis was

conducted using the Miles and Huberman model, which comprises data collection, data reduction, data display, and conclusion drawing. The findings indicate that the utilization of Interactive Flat Panels has a positive impact on the learning process, particularly in increasing the variety of teaching methods and learning media, strengthening teacher–student interaction, and enhancing students' motivation and engagement in learning activities. In addition, the program contributes to the improvement of teachers' digital competencies, although several challenges remain, including limited digital literacy, technological infrastructure constraints, and inadequate device maintenance systems. This study provides empirical insights into the implementation and impact of learning digitalization programs in primary schools and serves as a consideration for schools and policymakers in optimizing the use of educational technology.
Keywords: *learning digitalization, interactive flat panel, primary school, digital learning, teacher competence*

INTRODUCTION

The development of information and communication technology has had a significant impact on the field of education, including at the elementary school level. Learning digitalization has become a strategic effort to improve the quality of the learning process so that it becomes more interactive, engaging, and student-centered. The integration of technology in learning is considered essential to support the development of 21st-century skills, such as critical thinking, collaboration, and creativity (Setiawan et al., 2025).

Learning digitalization is closely associated with the use of interactive learning media that function as supporting tools for content delivery. Interactive learning media enable teachers to present instructional materials visually, auditorily, and kinesthetically, thereby helping students better understand learning concepts. One digital learning medium that has increasingly been adopted in elementary schools is the Interactive Flat Panel (IFP). An Interactive Flat Panel is an interactive touchscreen device that integrates the functions of a digital whiteboard, multimedia, and computer-based learning applications. A study conducted by Suryandari & Wakidah (2026) revealed that the use of IFPs in public elementary schools was able to enhance students' attention, active participation, and interaction during the learning process.

Various previous studies indicate that the use of interactive digital learning media has a positive impact on the learning process. Research by Sari et al. (2026)

demonstrated that interactive learning media could increase students' learning motivation and active participation. Other studies have also shown that the utilization of digital technology in classrooms helps teachers develop innovative instructional strategies and improves learning effectiveness. However, most of these studies focus on the use of digital media in general or are conducted at the secondary education level. Consequently, empirical studies that specifically examine the utilization of Interactive Flat Panels in elementary schools, particularly in public elementary schools, remain limited.

SDN 03 Sukorejo, Pemalang Regency, is one of the public elementary schools that received the distribution of Interactive Flat Panels as part of the government's learning digitalization program. Although the availability of IFP devices is expected to enhance the quality of learning, their implementation and impact in daily classroom practice largely depend on teachers' readiness, students' responses, and the availability of supporting school facilities and infrastructure. This condition indicates a research gap concerning how Interactive Flat Panels are utilized in learning activities and their impact on the learning process in elementary schools.

Based on the above considerations, this study aims to analyze the impact of the learning digitalization program through the distribution of Interactive Flat Panels at SDN 03 Sukorejo, Pemalang Regency. This study focuses on the impact of IFP utilization on the learning process, students' learning motivation, and teachers' digital competence.

This study employs a qualitative approach with a field research design, involving teachers and students as the primary data sources. Data were collected through classroom observations, interviews with teachers and students, and documentation. Data analysis was conducted using the Miles and Huberman model, which consists of four stages: data collection, data reduction, data display, and conclusion drawing or verification (Miles et al., 2020).

DISCUSSION

Implementation of the Learning Digitalization Program through Interactive Flat Panels

The implementation of the learning digitalization program through the distribution of Interactive Flat Panels (IFPs) at SDN 03 Sukorejo, Pemalang Regency, was carried out as part of the government's policy to support the digital transformation of education. Learning digitalization is viewed as a strategic effort to improve the quality of instruction through the utilization of educational technology (OECD, 2021). Based on the results of observations and interviews with school stakeholders, the distribution process of the Interactive Flat Panels was conducted centrally through the relevant authorities, and the devices were delivered directly to the school. After receiving the devices, the school placed the Interactive Flat Panels in classrooms considered strategic for supporting the learning process. The distribution of these devices was accompanied by general guidance on the use of Interactive Flat Panels; however, intensive technical assistance remained limited. This condition indicates that the learning digitalization program has primarily emphasized the provision of technological infrastructure, while efforts to strengthen users' capacity still need to be enhanced. This finding aligns with Arsyad (2021), who emphasizes that the successful utilization of instructional media largely depends on users' readiness.

The utilization of Interactive Flat Panels in learning activities at SDN 03 Sukorejo, Pemalang Regency, indicates that these devices have been used as supporting instructional media across various subjects. Teachers use Interactive Flat Panels to display learning materials in the form of presentations, instructional videos, as well as images and animations relevant to the subject matter. In addition, the devices are used as digital whiteboards to explain concepts and provide examples of exercises directly. The use of visual and multimedia-based instructional media is considered effective in helping students understand learning materials more concretely (Sijabat et al., 2024). Nevertheless, observational findings reveal that the utilization pattern of Interactive Flat Panels remains predominantly teacher-centered, with learning interactions largely dominated by teachers. Students' active participation in using the interactive features of the

devices is still limited, indicating that Interactive Flat Panels have not yet been fully utilized as interactive learning media. This finding is consistent with Sari et al. (2026), who argue that the effectiveness of interactive media is strongly influenced by the pedagogical strategies employed by teachers.

These conditions are closely related to the readiness of teachers and students to engage in digital-based learning. Teachers' readiness at SDN 03 Sukorejo, Pemalang Regency, in utilizing Interactive Flat Panels varies. Some teachers demonstrate positive attitudes and enthusiasm toward the use of technology in learning, particularly in presenting materials visually, and are able to operate the devices and integrate them into the instructional process. Teachers' positive attitudes toward technology are a crucial factor in the successful integration of technology in the classroom (Koehler et al., 2021). However, several teachers still experience difficulties in utilizing all features of the Interactive Flat Panels optimally due to limited digital literacy and the lack of continuous technical training. On the other hand, students show positive responses to the use of Interactive Flat Panels in learning activities. The use of interactive digital media has been shown to increase students' motivation and learning interest (Ainurrohmah et al., 2026), although students' direct involvement in using the devices still needs to be enhanced to foster more participatory and student-centered learning.

Figure 1. Learning Activities Utilizing Interactive Flat Panels at SDN 03 Sukorejo

The success of implementing the learning digitalization program through Interactive Flat Panels is also influenced by the availability of supporting school facilities and infrastructure. SDN 03 Sukorejo, Pemalang Regency, has basic facilities that support the use of Interactive Flat Panels, such as access to electricity and adequate classroom spaces. However, limited internet connectivity and the lack

of supporting devices remain challenges in optimizing the use of digital features. The availability of technological infrastructure is one of the key determinants of the success of digital-based learning in schools (Kemendikbudristek, 2023). In addition, device maintenance has become an important concern, as the school does not yet have a structured system for technical maintenance and management to ensure the long-term sustainability of Interactive Flat Panel usage. Therefore, support from school policies and sustainable maintenance planning is required to ensure that the utilization of Interactive Flat Panels can be implemented optimally and continuously.

Impact of the Learning Digitalization Program

The implementation of the learning digitalization program through the use of Interactive Flat Panels at SDN 03 Sukorejo, Pemalang Regency, has had a significant impact on classroom learning processes. The presence of Interactive Flat Panels has transformed the delivery of instructional content from a previously conventional approach into a more visual and multimedia-based format. Teachers no longer rely solely on verbal explanations but also utilize images, videos, and animations to clarify learning concepts. The use of visual and digital media helps create a more engaging learning environment and facilitates students' understanding of the subject matter, as stated by Miftah & Rohman (2021), who argue that instructional media play a crucial role in enhancing message clarity and learning effectiveness.

These changes in the learning process have also affected teacher–student interactions. Interactive Flat Panels provide opportunities for two-way interaction through more dynamic content presentation and students' responses to the displayed materials. Although classroom interaction remains largely teacher-dominated, the use of interactive media encourages students to be more active in asking questions and providing feedback during learning activities. This finding is consistent with Fitriani et al. (2022), who suggest that interactive learning technologies can improve the quality of classroom interaction when integrated with appropriate pedagogical strategies.

Furthermore, learning digitalization through Interactive Flat Panels has influenced the teaching methods and instructional media employed by teachers. Teachers have begun to combine lecturing with demonstrations, discussions, and the use of digital media as learning resources. This shift indicates a transition toward more varied and contextualized instructional approaches. The use of Interactive Flat Panels as primary instructional media also encourages teachers to seek out and prepare relevant digital learning materials, resulting in more structured and engaging learning processes (Rahmawati & Huda, 2023).

The positive impact of the learning digitalization program is also evident in increased student motivation and engagement. Based on questionnaire results and classroom observations, students demonstrate higher levels of enthusiasm when learning activities involve Interactive Flat Panels. Visually appealing displays and multimedia-based content presentation help students remain focused and interested in the learning process. This increase in learning motivation contributes to greater student engagement during classroom activities, as emphasized by Pratama & Setyaningrum (2022), who note that interactive instructional media can enhance students' interest and participation in learning.

The improvement in student motivation and engagement has implications for learning outcomes. Although this study does not focus on the quantitative measurement of learning outcomes, field findings indicate that students understand the material more easily and are better able to follow lessons when teachers utilize Interactive Flat Panels. Students become more responsive to teachers' explanations and grasp visually presented concepts more quickly. This finding aligns with Handayani et al. (2023), who state that the use of digital instructional media can enhance conceptual understanding and learning effectiveness.

On the other hand, the learning digitalization program also has an impact on teachers' digital competence. The utilization of Interactive Flat Panels encourages teachers to improve their ability to operate digital devices and develop technology-based instructional materials. Teachers gradually become more accustomed to using digital media in teaching and demonstrate increased confidence in integrating technology into instructional practices. Nevertheless, the extent of improvement in teachers' digital competence varies and is highly dependent on factors such as

experience, motivation, and access to training opportunities. This finding is consistent with the Technological Pedagogical Content Knowledge (TPACK) framework, which emphasizes the importance of integrating technological, pedagogical, and content knowledge in technology-based instruction (Angeli & Valanides, 2020).

Constraints and Challenges in Implementation

Although the learning digitalization program through the utilization of Interactive Flat Panels at SDN 03 Sukorejo, Pemalang Regency, has produced positive impacts on the learning process, its implementation still faces various constraints and challenges. Technical issues constitute one of the primary obstacles, particularly those related to the availability and stability of internet connectivity, electricity supply, and the limited availability of supporting devices. Unstable internet access often hinders teachers from accessing online learning resources or optimally utilizing digital features. This condition highlights that technological infrastructure readiness is a crucial factor in the successful implementation of digital-based learning in elementary schools (UNESCO, 2021).

In addition to technical constraints, challenges also arise from human resource aspects, particularly teachers' digital literacy. The findings indicate that teachers' abilities to operate and integrate Interactive Flat Panels into instructional practices vary considerably. Some teachers have not yet fully mastered the available features, resulting in device utilization being limited to basic functions such as displaying materials or writing digitally. Limited digital literacy and the lack of continuous professional training are factors that affect the optimization of Interactive Flat Panel usage. This finding aligns with Tondeur et al. (2021), who emphasize that effective technology integration in education requires a balance among technological, pedagogical, and content knowledge.

Another challenge encountered in the implementation of the learning digitalization program relates to device maintenance and sustainability. Interactive Flat Panels are technological devices that require regular maintenance to ensure long-term usability. However, observational findings reveal that the school has not yet established a structured system for technical maintenance and management,

either for routine upkeep or for handling technical malfunctions. Budget constraints and the absence of dedicated technical personnel further exacerbate the challenge of maintaining the sustainability of Interactive Flat Panel usage. This condition indicates that learning digitalization programs need to be accompanied by well-planned maintenance strategies to ensure that technological investments can be utilized sustainably.

These constraints have resulted in the suboptimal utilization of Interactive Flat Panels in classroom learning activities. Although the devices are available in classrooms, their use remains largely limited to functioning as digital presentation tools and has not yet fully supported interactive and collaborative learning. Technical barriers, limited teachers' digital competence, and insufficient maintenance support have prevented the full realization of the potential of Interactive Flat Panels as interactive instructional media. This finding reinforces the view that the success of learning digitalization programs depends not only on the availability of technological devices but also on the readiness of human resources, the adequacy of supporting infrastructure, and school policies that support the optimal use of educational technology (Erdem, 2022; Petko, 2020).

Efforts and Strategies for Program Optimization

Optimizing the learning digitalization program through the utilization of Interactive Flat Panels at SDN 03 Sukorejo, Pemalang Regency, requires well-planned and sustainable efforts, particularly in strengthening teachers' capacity as the primary users of instructional technology. One of the key strategies that needs to be implemented is the provision of systematic and continuous teacher training. Such training should not only focus on the technical aspects of operating Interactive Flat Panels but also on pedagogical strategies for integrating these devices into the teaching and learning process. Strengthening teachers' competence in utilizing instructional technology aligns with the Technological Pedagogical Content Knowledge (TPACK) framework, which emphasizes the integration of technological, pedagogical, and content knowledge in digital-based learning (Angeli & Valanides, 2023).

In addition to training, continuous mentoring in the use of Interactive Flat Panels in daily instructional practice is an important strategy for enhancing optimal device utilization. Mentoring can be conducted through academic supervision activities, the sharing of best practices among teachers, and technical support from relevant stakeholders. Through sustained mentoring, teachers are expected not only to be able to operate the devices effectively but also to develop more innovative, interactive, and student-centered learning practices. Tondeur et al. (2021) emphasize that ongoing support and mentoring are key factors in the successful implementation of educational technology in schools.

Efforts to optimize the learning digitalization program should also be directed toward integrating the use of Interactive Flat Panels with the existing curriculum. The utilization of instructional technology should be aligned with learning objectives, basic competencies, and the characteristics of elementary school students. Curriculum-aligned technology integration enables Interactive Flat Panels to function not merely as supplementary tools but as integral components of the instructional process. This perspective is consistent with the OECD (2021), which highlights that digital transformation in education must be aligned with curriculum goals and learning objectives to produce a meaningful impact on educational quality.

Policy support from both schools and the government is another determining factor in optimizing the learning digitalization program. Schools need to formulate internal policies that support the effective use of Interactive Flat Panels, such as scheduling device usage, allocating budgets for maintenance, and providing opportunities for teachers to innovate in instructional practices. At the same time, government support in the form of policies, mentoring, and the sustainable provision of facilities and infrastructure is essential to ensure the continuity of learning digitalization programs. Synergy between schools and government stakeholders is expected to foster a conducive and sustainable digital learning ecosystem (World Bank, 2022).

CONCLUSION

Based on the research findings, it can be concluded that the learning digitalization program through the distribution of Interactive Flat Panels at SDN 03 Sukorejo, Pemalang Regency, has had a positive impact on the learning process in elementary schools. Specifically, the program has contributed to increasing the variety of instructional methods and media, strengthening teacher–student interactions, and enhancing students' motivation and engagement in learning activities. The utilization of Interactive Flat Panels has also encouraged the improvement of teachers' digital competence in integrating technology into instruction, although the level of mastery varies among teachers. Nevertheless, the implementation of the program still faces several challenges, including limitations in technological infrastructure, uneven levels of teachers' digital literacy, and the lack of an optimal system for device maintenance and sustainability. This study provides empirical contributions to the understanding of learning digitalization program implementation in elementary schools and emphasizes that the successful utilization of educational technology depends not only on the availability of technological devices but also on the readiness of human resources, the adequacy of supporting infrastructure, and sustainable school and government policies. Therefore, future research is recommended to examine the impact of this program using quantitative approaches and across broader school contexts.

REFERENCES

Ainurrohmah, A. U., Erhamwilda, E., & Suhardini, A. D. (2026). Peran Media Digital Interaktif Smartboard terhadap Motivasi Belajar Siswa Sekolah Dasar. *Jurnal Ilmu Pendidikan Dan Psikologi (JIPP)*, *4*(1), 17–27. https://doi.org/https://doi.org/10.61116/jipp.v4i1.754

Angeli, C., & Valanides, N. (2020). TPACK 2.0: A Revised Framework for Technology Integration in Education. *Computers \& Education*. https://doi.org/10.1016/j.compedu.2020.103853

Angeli, C., & Valanides, N. (2023). Developing teachers' technological pedagogical content knowledge (TPACK): A systematic review. *Educational Technology Research and Development*, *71*(2), 1–25.

Arsyad, A. (2021). *Media Pembelajaran* (Edisi Revisi). Rajawali Pers.

Erdem, C. (2022). Sustainability and maintenance challenges of educational

technology in schools. *Journal of Educational Administration and Policy*, *5*(2), 45–56.

Fitriani, L., Suryadi, D., & Wahyuni, S. (2022). Pemanfaatan Media Digital Interaktif untuk Meningkatkan Interaksi Pembelajaran. *Jurnal Penelitian Dan Evaluasi Pendidikan*. https://journal.uny.ac.id/index.php/jpep/article/view/48663

Handayani, S., Nurhasanah, N., & Sulastri, D. (2023). Pengaruh Media Visual Digital terhadap Pemahaman Konsep Siswa Sekolah Dasar. *Jurnal Pendidikan Teori, Penelitian, Dan Pengembangan*. https://journal.um.ac.id/index.php/jptpp/article/view/17654

Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi. (2023). *Peta Jalan Transformasi Digital Pendidikan Indonesia*.

Koehler, M. J., Mishra, P., & Cain, W. (2021). What Is Technological Pedagogical Content Knowledge (TPACK)? *Journal of Education*, *193*(3), 13–19. https://doi.org/10.1177/00220574211065066

Miftah, M., & Rohman, A. (2021). Pengembangan Media Pembelajaran Digital dalam Pembelajaran Sekolah Dasar. *Jurnal Pendidikan Dasar*. https://ejournal.unesa.ac.id/index.php/jurnal-pendidikan-dasar/article/view/40577

Miles, M. B., Huberman, A. M., & Saldana, J. (2020). *Qualitative Data Analysis*. Sage.

OECD. (2021). *Education at a Glance 2021: OECD Indicators*. OECD Publishing. https://doi.org/10.1787/b35a14e5-en

Petko, D. (2020). Barriers to the integration of digital technologies in education. *Computers in Schools*, *37*(3), 123–138.

Pratama, R., & Setyaningrum, W. (2022). Pengaruh Media Pembelajaran Digital terhadap Motivasi Belajar Siswa Sekolah Dasar. *Jurnal Inovasi Pendidikan*. https://journal.unnes.ac.id/sju/index.php/jip/article/view/56032

Rahmawati, I., & Huda, M. (2023). Transformasi Media Pembelajaran Digital di Sekolah Dasar. *Jurnal Teknologi Pendidikan Islam*. https://ejournal.uin-malang.ac.id/index.php/jtpi/article/view/21492

Sari, A. M., Muthoharoh, T., & Amelia, R. (2026). *Pemanfaatan Interactive Flat Panel (IFP)/ Smartboard sebagai Media Pembelajaran Interaktif di SDN Pelambuan 4 Banjarmasin*. *6*, 170–183.

Setiawan, A., Susanto, T. B., & Putri, P. V. A. (2025). Implementasi Multimedia Interaktif untuk Meningkatkan Interaksi dan Kolaborasi Siswa dalam Pembelajaran Digital Di Kelas IV Sekolah Dasar. *JOURNAL OF EDUCATION FOR ALL*, *3*(4), 132–139.

https://doi.org/10.61692/edufa.v3i4.364

Sijabat, M. P., Hutabarat, K., Sitorus, L., Salsabilla, S., & Khairunnisa, K. (2024). Media Pembelajaran Interaktif dalam Meningkatkan Hasi Belajar Siswa Kelas V di Sekolah Dasar. *Jurnal Basicedu*, *8*(3), 2398–2409. https://doi.org/10.31004/basicedu.v8i3.7941

Suryandari, D. A., & Wakidah, S. A. (2026). Pemanfaatan Teknologi Interactive Flat Panel (IFP) Sebagai Sarana Pembelajaran Aktif Pada Pembelajaran IPAS Kelas IV Di SDN Menteng Atas 01 Jakarta Selatan Dwi. *JKIP : Jurnal Kajian Ilmu Pendidikan*, *7*(1), 313–319.

Tondeur, J., Scherer, R., Siddiq, F., & Baran, E. (2021). Preparing teachers for technology use in education: A critical review. *Educational Technology Research and Development*, *69*(1), 1–28.

UNESCO. (2021). *Reimagining our futures together: A new social contract for education*.

World Bank. (2022). *Realizing the Promise of Education Technology*.