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Analysis of the Implementation of Interactive Flat Panel in Supporting the Digitalization of Learning at SDN 1 Sido Makmur

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ABSTRACT

The advancement of technology in the fourth industrial revolution era has made learning digitalization an urgent priority in primary schools, yet infrastructure limitations remain a significant challenge. SDN 1 Sido Makmur received a single 75-inch Interactive Flat Panel (IFP) unit as a government grant under the national school digitalization program. This study aimed to obtain an in-depth understanding of the IFP implementation process, its supporting and inhibiting factors, and its contribution to learning digitalization at SDN 1 Sidomakmur. A descriptive qualitative approach with a case study design was employed. Subjects were determined through purposive sampling, comprising the school principal, three classroom teachers, and six students. Data were collected through observation, semi-structured interviews, and documentation, then analyzed using the Miles, Huberman, and Saldaña interactive model and validated through triangulation. The findings revealed that the single IFP limitation was addressed through a structured rotation schedule, ensuring equitable classroom access and organically fostering a teacher material-sharing community. Planned IFP use increased student motivation, material visualization quality, and active participation, particularly in IPAS and Mathematics. Implementation success was driven more by transformational leadership and teacher collaboration culture than by device quantity. Government IFP programs will have greater impact when accompanied by management guidance and continuous TPACK training.

Informasi Artikel

Kata Kunci:

Interactive Flat Panel; Digitalisasi Pembelajaran; Sekolah Dasar; Studi Kasus; TPACK

ABSTRAK

Perkembangan teknologi di era revolusi industri 4.0 mendorong urgensi digitalisasi pembelajaran di sekolah dasar, namun keterbatasan infrastruktur menjadi tantangan nyata bagi banyak sekolah. SDN 1 Sidomakmur menerima satu unit Interactive Flat Panel (IFP) berukuran 75 inci sebagai bantuan pemerintah dalam program digitalisasi sekolah nasional. Penelitian ini bertujuan memperoleh gambaran mendalam mengenai proses implementasi IFP, faktor pendukung dan penghambatnya, serta kontribusinya terhadap digitalisasi pembelajaran di SDN 1 Sido Makmur. Penelitian menggunakan pendekatan kualitatif deskriptif dengan desain studi kasus. Subjek ditentukan secara purposive sampling meliputi kepala sekolah, tiga guru kelas, dan enam siswa. Data dikumpulkan melalui observasi, wawancara semi-terstruktur, dan dokumentasi, kemudian dianalisis menggunakan model interaktif Miles, Huberman, dan Saldaña serta divalidasi melalui triangulasi. Hasil penelitian menunjukkan keterbatasan satu unit IFP diatasi melalui sistem rotasi terjadwal yang mendorong pemerataan akses dan terbentuknya komunitas berbagi bahan ajar digital antarguru secara organik. Penggunaan IFP berdampak positif terhadap motivasi belajar siswa, kualitas visualisasi materi, dan partisipasi aktif, khususnya pada mata pelajaran IPAS dan Matematika. Keberhasilan implementasi lebih ditentukan oleh kepemimpinan transformasional dan budaya kolaborasi antarguru dibandingkan kuantitas perangkat. Program bantuan IFP akan lebih berdampak apabila disertai pendampingan pengelolaan dan pelatihan TPACK berkelanjutan.

Article History

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1. Introduction

The development of information and communication technology in the era of the Fourth Industrial Revolution has driven a major transformation in the world of education. The digitization of learning is no longer merely an option but a fundamental necessity for producing an adaptive and competent generation. Isma, Rahmi, and Jamin (2022) emphasize that the digitization of school education is an urgency that cannot be ignored in order to build a learning system relevant to the 21st century. In line with this, Wahyudi and Jatun (2024) state that the integration of technology in elementary schools presents significant opportunities as well as challenges, particularly regarding teacher readiness and the availability of adequate digital infrastructure.

One of the educational technology innovations now being implemented in various schools is the Interactive Flat Panel (IFP), a large touchscreen device that integrates the functions of a whiteboard, projector, and computer into a single unit. Research by Jumiati, Sulistyawan, and Siswadi (2025) demonstrates that the use of IFPs as an interactive learning medium significantly enhances student engagement and enthusiasm. In line with this, Indriansyah (2025) concluded that the presence of IFPs in the classroom has been shown to increase learning motivation and encourage collaboration among students. However, the success of their implementation depends heavily on teacher competence, the availability of digital content, and school infrastructure support (Aristasari & Wantoro, 2024).

SDN 1 Sidomakmur is one of the schools that received a single IFP unit from the government as part of the national school digitization program (Ministry of Education, Culture, Research, and Technology, 2020). The availability of this IFP unit serves as a starting point for the school in its transition toward technology-based learning. Based on initial observations, some teachers have shown enthusiasm in utilizing the IFP to present material in a more varied manner, and students appear more active and enthusiastic. However, with only one IFP unit available for all classes, its use has not yet been equitable or sustainable. This situation is supported by the findings of Suryandari, Prasetyo, and Wibowo (2025), who state that the use of IFPs in elementary schools is not yet optimal due to limited resources and teachers' lack of proficiency with the features.

The gap between the potential of IFP and the existing limitations at SDN 1 Sidomakmur presents an intriguing issue that warrants in-depth analysis. This study aims to provide a realistic picture of the IFP implementation process, its supporting and inhibiting factors, and its contribution to the digitization of learning at SDN 1 Sidomakmur, thereby serving as a reference for other schools facing similar conditions.

2. Method

This study employs a qualitative approach using a descriptive research method and a case study design. This approach was chosen to gain a deep understanding of and provide a detailed description of the phenomenon of IFP implementation at SDN 1 Sidomakmur as it occurs in the field. The research was conducted at SDN 1 Sidomakmur over a period of approximately two months. The research subjects were determined through purposive sampling, including the principal, three classroom teachers who actively use IFP, and six students as supporting informants, bringing the total number of informants to ten.

Data collection was conducted using three methods: (1) direct observation to examine the use of IFPs in the learning process; (2) semi-structured in-depth interviews with school principals, teachers, and students; and (3) documentation of IFP usage schedules, photos of activities, and government-provided IFP support materials. Data were analyzed using the Miles, Huberman, and Saldana (2020) interactive model through three stages: data reduction, data presentation, and drawing conclusions. Data validity was ensured through source triangulation (school principals, teachers, and students), methodological triangulation (interviews, observations, and documentation), and member checking with informants to ensure the accuracy of the research findings (Sugiyono, 2022).

3. Results and Discussion

The following presents the research findings based on three main areas of focus: (1) the availability and management system of IFP, (2) the impact of IFP use on learning, and (3) enabling factors, barriers, and policy implications.

3.1 Availability of IFP as Government Assistance and Its Management System

SDN 1 Sidomakmur received a 75-inch IFP as government assistance through the school digitization program under the Ministry of Education, Culture, Research, and Technology's 2020–2024 Strategic Plan (Kemendikbudristek, 2020). This device is equipped with a multi-touch screen, wireless connectivity, an Android operating system, and digital annotation features; it was installed in 2025 along with training from a team of supporting technicians. Fatrisna et al. (2024) assert that government technology interventions are a key determinant of the acceleration of digitization in schools with limited independent budgets, and this situation is clearly reflected at SDN 1 Sidomakmur.

The limited availability of a single unit prompted the principal to design a structured rotation system: each class receives two sessions per week (Monday–Saturday, 7:30–9:30 a.m.) for the subjects that most require visual aids, namely Science, Mathematics, Social Studies, and Indonesian Language. Isma et al. (2022) emphasize that the urgency of digitization does not depend on the quantity of devices, but rather on collective will and the quality of management. Triangulating sources between the statements of the principal, teachers, and students reveals consistent findings that this rotation system has successfully built a fair and well-planned digital learning ecosystem.

"With a clear schedule, all teachers are better prepared and organized. There's no scrambling, and every teacher has enough time to prepare their digital materials. (Interview with KS, April 2026)"

3.2 Impact of IFP Use on Learning

IFP implementation includes multimedia presentations, educational videos, digital annotations, and interactive quizzes using Quizizz. The benefits and challenges identified by all informants are presented in Table 1.

Table 1 Findings on the Benefits and Challenges of IFP Use at SDN 1 Sidomakmur (Source: Primary data, interview results, 2026)

Informant	Perceived Benefits	Challenges Faced
Teacher A (Grade 6)	Science and Math are easier to visualize; Quizizz quizzes are effective for ANBK preparation	Waiting for the schedule; preparing digital teaching materials takes longer
Teacher P (4th Grade)	Multimedia presentations boost enthusiasm; annotation features help explain social studies maps	The internet connection is unstable; materials must be downloaded in advance
Teacher E (Grade 5)	Digital annotations and interactive maps facilitate social studies learning	Not all teachers are yet accustomed to creating IFP content independently
4th Grade Students	Images and videos are clearly visible from all seats; science comprehension has improved	Want to use the IFP more often
5th Grade Students	Direct interaction on the screen reinforces retention of the material; learning is more enjoyable	—
6th Grade Students	Helps with independent learning; material that isn't understood can be reviewed right away	—

Based on Table 1, all informants reported positive responses. Indriansyah (2025) demonstrated that IFP significantly enhances student motivation and collaborative learning through the delivery of multimodal information—a finding consistent with the experiences of teachers and students at SDN 1 Sidomakmur. Jumiati et al. (2025) added that IFP is capable of creating more active, participatory, and student-centered learning, while Aryfien et al. (2024) systematically demonstrated that interactive learning media consistently enhances learning motivation in elementary schools.

"When there's a quiz on the screen, I'm really excited to answer. The score pops up right away, so I know where I went wrong. Learning math isn't scary for me anymore. (Interview with G, 6th-grade student, April 2026)"

Kurniawan and Hakim (2024) emphasize that IFP provides a multimodal learning experience that accommodates various learning styles—an advantage that conventional static media cannot offer. Riyadi and Ningsih (2024) reinforce this finding by identifying significant positive impacts of IFP on student engagement and learning outcomes, particularly in science, math, and social studies.

3.3 Supporting Factors, Barriers, and Policy Implications

The successful implementation of a single IFP unit is supported

by three key factors: (1) the principal's transformational leadership in designing a collaborative management system; (2) a strong culture of collaboration among teachers, reflected in the organic formation of a WhatsApp group for sharing digital teaching materials; and (3) teachers' motivation to innovate independently. Wardoyo (2024) emphasizes that teachers' digital competencies and readiness are the most critical determinants of the success of school digitization programs. Miftah and Rozi (2022) note that the digital divide is often exacerbated by unequal management; the rotation system at SDN 1 Sidomakmur serves as a concrete model for addressing this potential disparity.

The main challenges identified were unstable internet connections and teachers' techno-pedagogical competencies, which still need to be developed. Tondeur et al. (2022) emphasize that enhancing TPACK is a prerequisite for the use of technology to evolve from a substitution level to a transformation level. Purnasari et al. (2024) found a similar pattern in elementary schools in underserved areas: device limitations do not become a determining barrier as long as there is strong leadership commitment and a well-planned management system. These findings provide empirical evidence that IFP assistance programs will have a greater impact if accompanied by management support and ongoing TPACK training, rather than focusing solely on device procurement.

4. Conclusion

This study concludes that the implementation of a single IFP unit as government assistance at SDN 1 Sidomakmur has successfully served as a meaningful entry point for the digitization of learning. First, the limitation of having only one IFP unit was addressed through a fair, scheduled rotation system, ensuring that all classes received equal access. This system also encouraged the organic formation of a community among teachers for sharing digital teaching materials. Second, the planned use of the IFP has yielded positive impacts, including increased student motivation, improved visual presentation of materials, and active participation—particularly in Science, Mathematics, and Social Studies. Third, the success of the implementation is more determined by managerial and social factors—the principal's transformational leadership, a culture of collaboration among teachers, and a commitment to innovation—rather than the quantity of available devices. The main challenges—including internet instability and teachers' still-developing TPACK competencies—constitute improvement priorities that the education office must address immediately through ongoing TPACK mentoring and training programs.

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