

Research Article

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The Role of Interactive Flat Panel (IFP) in Shaping Indonesia's Digital Learning Policy: A Vision for Educational Reform in the Prabowo–Gibran Era

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Abstract: This study explores the role of Interactive Flat Panels (IFPs) as transformative digital learning media in shaping Indonesia's educational reform under the Prabowo–Gibran administration (2024–2029). The research employs a descriptive qualitative approach, synthesizing scholarly literature and education policy analyses to conceptualize how IFP integration supports national digital education goals. Globally, IFPs have been proven to enhance student engagement, learning outcomes, and teacher performance through interactive, multimedia-based instruction. Within the Indonesian context, their adoption aligns with the Merdeka Belajar and Smart Schools Indonesia initiatives, which emphasize technological equity, digital sovereignty, and 21st-century learning competencies. The findings indicate that IFPs can foster interactive and collaborative learning environments, strengthen teachers' digital competencies, and facilitate Education 5.0 implementation nationwide. However, several barriers persist, including infrastructure inequality, limited teacher readiness, and financial constraints in public schools. Addressing these challenges requires multi-sectoral collaboration, capacity-building programs, and localized production strategies to ensure sustainability and affordability. The study concludes that IFPs are not merely instructional technologies but strategic policy instruments driving Indonesia's digital transformation in education. Their effective integration can bridge pedagogical and technological divides, positioning Indonesia as a leader in digital learning innovation across Southeast Asia.

Keywords: Interactive Flat Panel (IFP), Digital Learning; Education Policy, Prabowo–Gibran Administration, Smart Classroom, Digital Sovereignty, Education 5.0.

Introduction

The digital revolution has fundamentally transformed education systems worldwide, redefining how teaching and learning occur in the 21st century. The rapid advancement of interactive educational technologies has shifted the paradigm from teacher-centered instruction toward student-centered, participatory, and technology-integrated learning environments. Among these innovations, the Interactive Flat Panel (IFP) has emerged as one of the most influential tools in fostering dynamic and collaborative classroom ecosystems. As an evolution of the traditional whiteboard, the IFP offers touch-based interactivity, multimedia integration, and cloud connectivity, enabling real-time engagement between students and teachers.

Empirical evidence from developing regions highlights the transformative impact of IFPs. For instance, research conducted in India's Andhra Pradesh district demonstrated that classrooms equipped with IFPs significantly improved students' academic achievement and engagement levels (Kasa et al., 2024). Students expressed optimism about IFPs' role in enhancing interactive learning experiences, while teachers reported improved instructional efficiency. Similarly, global studies on technology integration indicate that digital boards and interactive displays can significantly increase motivation, comprehension, and participation among learners (Al-Sindi et al., 2023).

The shift toward interactive digital learning aligns with global trends under the framework of *Education 5.0*, emphasizing creativity,

collaboration, and digital literacy. These competencies are crucial in preparing future generations for the Fourth Industrial Revolution (IR 4.0), where human-machine collaboration and artificial intelligence play an increasingly central role.

In Indonesia, the digitalization of education has accelerated dramatically since the COVID-19 pandemic, which exposed critical gaps in digital infrastructure and teaching readiness. The pandemic compelled institutions to adopt online and hybrid learning modalities, leading to the emergence of various digital learning platforms and interactive technologies (Choiriyah, 2023). However, these rapid changes also revealed inequalities in access to technology, unstable internet connectivity, and limited teacher preparedness.

Recognizing these challenges, the Indonesian government has prioritized digital transformation in education through strategic initiatives such as *Merdeka Belajar*, *Smart Schools Indonesia*, and the *Digital Talent Scholarship* program. The upcoming Prabowo–Gibran administration (2024–2029) has expressed a strong commitment to strengthening *digital sovereignty* and *education technology ecosystems*. Their vision underscores the integration of technology into national education systems, focusing on equitable access, improved teacher capacity, and the development of a technologically literate workforce.

Within this policy landscape, Interactive Flat Panels (IFPs) represent a key enabler of digital transformation at the school level. As interactive media devices, IFPs align with the government's goal of modernizing classroom infrastructure to support *Smart Classroom* models. By combining interactivity, collaboration, and digital resources, IFPs enhance teaching efficiency and foster active learning—an essential feature of *Merdeka Belajar* pedagogy.

The pedagogical foundation of IFP implementation draws from constructivist and

participatory learning theories, which emphasize learner engagement, experiential interaction, and collaborative knowledge construction. Studies across multiple contexts confirm that interactive media significantly enhance problem-solving skills, communication, and higher-order thinking (Choirudin & Lubis, 2025). The integration of IFPs, therefore, complements these learning models by providing multimodal engagement through touch, visuals, sound, and motion—stimulating cognitive and affective dimensions of learning.

Furthermore, the use of IFPs supports differentiated instruction by accommodating diverse learning styles—visual, auditory, and kinesthetic. Teachers can display dynamic content such as simulations, real-time annotations, and educational videos, transforming static classrooms into interactive, multimedia-driven spaces. This aligns with research indicating that interactive digital storytelling and gamified learning tools enhance learners' higher-order thinking skills (HOTs) and engagement, especially in EFL and STEM education contexts (Setiawati & Setyarini, 2020).

However, successful IFP implementation requires teacher readiness, institutional support, and robust digital infrastructure. A 2024 study on Indonesian teachers' preparedness for deep learning integration found moderate technical confidence but high motivation, emphasizing the need for professional training and systemic support (Subiyantoro & Musa, 2024).

Despite its pedagogical potential, implementing IFP technology in Indonesian classrooms faces multifaceted challenges. First, digital infrastructure inequality remains a significant obstacle, particularly between urban and rural schools. Many schools lack stable internet access, reliable electricity, and appropriate classroom facilities to host advanced technologies. Second, teacher digital literacy levels vary widely. While younger educators often

adapt quickly, older teachers may require targeted training and ongoing mentorship.

Third, budgetary constraints impede large-scale procurement and maintenance of IFPs. As noted by earlier studies, even in higher education, the high cost of interactive whiteboards or flat panels—ranging up to tens of millions of rupiah per unit—limits their adoption despite proven effectiveness (Muhdi et al., 2019).

Moreover, there are health and ergonomic concerns related to prolonged exposure to interactive screens among children, including visual fatigue and eye strain, which necessitate responsible and moderated usage (Berezina et al., 2021).

Under the Prabowo–Gibran administration, the national vision for education reform is strongly tied to the concept of *Digital Sovereignty*—a strategic framework ensuring that Indonesia can produce, manage, and utilize its own technological infrastructure for education and governance. The government's *100 Smart Schools* initiative aims to integrate IoT-enabled learning environments, interactive displays, and AI-based teaching aids into the education system.

The Interactive Flat Panel is expected to play a vital role in this ecosystem by:

1. Enhancing teacher-student interaction in real time;
2. Supporting multimedia-based curriculum delivery;
3. Bridging the gap between online and offline learning through hybrid teaching modes;
4. Promoting inclusive education through accessible visual and auditory materials.

Thus, IFP deployment aligns with the administration's broader agenda of fostering a digitally empowered generation capable of competing in global innovation-driven economies.

Indonesian studies on interactive media reinforce the benefits of integrating digital tools in classrooms. For example, the use of Wordwall interactive games in foreign language instruction

significantly enhanced engagement and learning outcomes (Septriani & Rustandi, 2023). Similarly, the adoption of Lumi Education interactive media improved student achievement and motivation in civic education classes (Santika & Mushlihuddin, 2025).

In addition, blended learning approaches combining IFPs, tablets, and AI-powered educational software have shown to significantly enhance cognitive and affective learning outcomes in rural schools (Kasa et al., 2024). These findings underscore that interactive media technologies are not only pedagogically effective but also capable of addressing equity and inclusion in diverse educational settings.

While the global and national literature highlights the educational benefits of interactive technologies, few studies have explicitly analyzed the strategic role of IFPs in shaping Indonesia's digital education policy—particularly within the evolving context of the Prabowo–Gibran administration. Most existing studies focus on micro-level outcomes such as classroom engagement or teacher attitudes, rather than macro-level policy implications and systemic integration.

Therefore, this article aims to fill this research gap by presenting a conceptual and descriptive analysis of IFPs as catalysts for digital learning reform in Indonesia. The study seeks to address the following questions:

1. How can IFPs contribute to achieving Indonesia's digital education goals under the Prabowo–Gibran government?
2. What are the pedagogical, infrastructural, and policy challenges associated with their implementation?
3. What strategies can be proposed to maximize IFP adoption within Indonesia's education ecosystem?

This study adopts a multi-theoretical framework combining:

- a) Constructivism theory — emphasizing learner-centered engagement through interaction and experience.
- b) Technological Pedagogical Content Knowledge (TPACK) — highlighting teachers' capacity to integrate technology effectively.
- c) Policy implementation theory — focusing on how technological innovations are institutionalized through national education frameworks.

Through this lens, IFPs are positioned not merely as tools but as *policy instruments* capable of transforming educational delivery and management at scale.

This paper contributes to both academic and policy discourse by:

- 1) Offering a synthesis of global and Indonesian evidence on IFPs' educational impact;
- 2) Contextualizing IFP implementation within Indonesia's emerging digital education policies;
- 3) Providing strategic insights for the Prabowo–Gibran administration and stakeholders aiming to foster equitable, technology-driven educational reform.

Ultimately, this study argues that Interactive Flat Panels are not only technological devices but strategic enablers of Indonesia's educational transformation toward *Digital Sovereignty* and *Education 5.0*.

Method

This study employs a descriptive qualitative research design aimed at conceptually analyzing the role of the Interactive Flat Panel (IFP) in shaping Indonesia's digital learning policy during the Prabowo–Gibran administration (2024–2029). The research does not rely on empirical or statistical data collection but rather on a synthesis of scholarly literature, government policy documents, and academic studies concerning

digital learning, educational technology integration, and national education reforms.

A descriptive qualitative approach was selected to provide an in-depth understanding of the pedagogical, technological, and policy dimensions of IFP implementation. This method allows for an interpretive examination of the phenomena based on contextual and theoretical insights rather than numerical data. It aligns with the objective of exploring how IFPs function as catalysts for education reform and digital transformation in Indonesia.

The analysis integrates secondary data derived from peer-reviewed academic journals, official policy frameworks from the Indonesian Ministry of Education, and global studies on technology-enhanced learning. Key literature includes recent findings on interactive learning technologies (Kasa et al., 2024), teacher readiness in digital education (Subiyantoro & Musa, 2024), and integration of interactive panels in classrooms (Al-Sindi et al., 2023).

The study employs literature synthesis and conceptual analysis to identify recurring patterns, opportunities, and challenges in IFP adoption. Themes such as *pedagogical innovation*, *policy integration*, and *technological infrastructure* were extracted and critically examined. The process followed three analytical stages:

1. Collection of relevant publications and policy documents;
2. Interpretation of key findings based on theoretical frameworks (constructivism and TPACK);
3. Synthesis of insights to formulate implications for Indonesia's educational policy development.

To ensure validity, only credible, peer-reviewed, and policy-relevant sources were included. The study upholds academic integrity and originality, maintaining a plagiarism threshold below 20%. All cited works are appropriately referenced using APA 7th edition standards.

This methodological framework provides a rigorous foundation for analyzing how IFP technology can shape digital education policy and pedagogical practices in Indonesia under the Prabowo–Gibran leadership.

Results and Discussion

Global Perspectives on IFP Adoption in Education

Globally, the adoption of Interactive Flat Panels (IFPs) has significantly transformed teaching and learning dynamics in schools and universities. IFPs provide digital interactivity, visual collaboration, and integrated multimedia resources that make learning more immersive and participatory. According to a 2024 international study, the integration of IFPs and AI-enhanced tools in Indian secondary schools resulted in *substantial improvement in students' academic performance and learning motivation*, especially in underdeveloped rural areas (Kasa et al., 2024).

Students demonstrated higher achievement scores and positive attitudes toward interactive lessons, while teachers observed improved engagement and understanding through visual and collaborative features. These findings support the idea that digital interaction enhances not only academic outcomes but also *student agency* — the ability to take active control of one's learning process.

Further, a usability study of IFPs conducted by Chien (2024) revealed that while the technology significantly improved teaching quality and classroom engagement, challenges in usability design and teacher training remained substantial (Chien, 2024). The study recommended stronger institutional support, improved software interfaces, and comprehensive teacher training to fully optimize IFP-based interactive instruction.

These findings are aligned with earlier pedagogical research showing that interactive whiteboards and animation media increased

motivation, creativity, and student satisfaction when used under the *Smart Pedagogy* approach (Muhdi et al., 2019). Thus, IFPs represent a convergence point between pedagogy, technology, and policy in the evolution of digital education worldwide.

The Role of IFP in Indonesia's Emerging Digital Education Landscape

In Indonesia, interactive digital technologies have been increasingly recognized as enablers of quality education and inclusivity. The “Merdeka Belajar” policy by the Ministry of Education and Culture has promoted *freedom to innovate* in teaching and learning — emphasizing creativity, problem-solving, and technology integration.

The implementation of interactive media such as IFPs, smart boards, and gamified applications has already shown tangible results. For example, the use of Lumi Education interactive learning media significantly improved learning outcomes in *Pancasila education*, increasing average student achievement scores from 70.71 to 83.57 within two cycles of implementation (Santika & Mushlihuddin, 2025).

Similarly, the use of interactive learning programs at Islamic boarding schools in Indonesia was shown to enhance both language proficiency and student confidence, with notable improvements in speaking fluency (+22.4 points) and reading comprehension (+20.4 points) (Lazuardi & Syaheed, 2024).

These results confirm that interactive pedagogy grounded in constructivism theory — where students actively construct knowledge through digital experiences — can yield high learning engagement and retention. Consequently, the integration of IFPs in classrooms aligns perfectly with the current pedagogical transformation envisioned by Indonesia's education policy framework.

Alignment Between IFP and the Prabowo–Gibran Education Vision

The Prabowo–Gibran administration (2024–2029) emphasizes *Digital Sovereignty*, *Educational Transformation*, and *National Competitiveness* as key pillars of governance. Their digital education roadmap envisions the modernization of schools through AI-assisted learning tools, smart classrooms, and adaptive learning platforms.

Within this strategic context, IFPs serve as a policy instrument that bridges technology and pedagogy. They embody the administration's objective to:

- a) Modernize learning environments through interactive, digital classrooms.
- b) Facilitate equitable access to technology-based learning across Indonesia's diverse regions.
- c) Enhance teachers' digital competencies through systematic training programs.

As Suwandi et al. (2024) emphasize, improving education quality in secondary schools requires integrating technology-based learning models and ensuring teacher readiness and infrastructure availability (Suwandi et al., 2024). IFPs directly support this policy direction by fostering *blended learning ecosystems* where digital and traditional pedagogies coexist synergistically.

Moreover, the use of IFPs supports Prabowo–Gibran's goal of establishing “Smart Schools Indonesia”, envisioned as hubs of innovation and local technological empowerment. Through these initiatives, IFP adoption becomes both a symbol and a practical mechanism of Indonesia's education reform strategy.

Pedagogical Impacts of IFP Integration

From a pedagogical standpoint, IFPs contribute to three critical dimensions of educational quality:

1. Engagement and Motivation

Students experience increased enthusiasm and participation in lessons that involve touch

interaction, real-time annotation, and multimedia resources. Studies on interactive tools such as Flipbook learning media reveal that interactivity significantly enhances *student engagement* and *learning experience* (Darmawan et al., 2024).

2. Active Learning and Collaboration

IFPs promote collaborative activities, allowing students to solve problems, manipulate digital content, and interact simultaneously on shared digital surfaces. Such experiences cultivate higher-order thinking skills (HOTS) and teamwork abilities, aligning with the Kurikulum Merdeka objectives.

3. Teacher Efficiency and Flexibility

Teachers benefit from easier content delivery, digital annotation tools, and the integration of online resources. This efficiency enables educators to spend more time facilitating rather than lecturing — transitioning from content deliverers to *learning designers*.

Evidence from Indonesia's teacher professional development programs indicates that improved *classroom management self-efficacy* (CMSE) is strongly linked with digital training and exposure to interactive teaching tools (Purniningtyas et al., 2024).

Implementation Challenges and Strategic Barriers

Despite these benefits, widespread adoption of IFPs in Indonesia faces several challenges:

1. Infrastructure Gaps

Many rural and remote schools still struggle with unstable electricity, weak internet access, and limited funding for technology procurement. This digital divide creates unequal opportunities for students and teachers to engage in interactive learning (Suseno et al., 2024).
2. Teacher Readiness

Teachers often exhibit varying levels of digital literacy. A lack of structured training programs and technical support impedes the effective use

of IFP features. Training must therefore be integrated into the national teacher competency framework.

3. Cost and Maintenance

As highlighted by previous studies, the high initial investment cost (up to 80 million IDR per unit) limits scalability, especially in public schools with constrained budgets (Muhdi et al., 2019). Long-term maintenance and software updates also require sustainable funding mechanisms.

4. Health and Ergonomic Concerns

Overexposure to bright digital panels may cause visual fatigue, especially among younger students (Berezina et al., 2021). Thus, usage policies must balance technological benefits with student well-being.

Opportunities for Policy Integration and Reform

The Prabowo–Gibran administration presents a unique opportunity to embed IFPs into the national education system through well-defined policies. The integration of IFPs aligns with Indonesia's National Digital Transformation Framework, which emphasizes infrastructure improvement, digital literacy, and local innovation.

Key opportunities include:

- a) Policy Integration: Embedding IFP adoption in the *Smart Classroom* initiative under the Ministry of Education and Culture.
- b) Public–Private Partnerships (PPP): Collaboration between technology firms (e.g., BenQ, LG, Polytron) and the government to produce locally assembled IFPs at reduced costs.
- c) Teacher Capacity Development: Expanding professional training programs (e.g., PPG, Diklat Digital) to include *interactive pedagogy modules*.
- d) Research and Evaluation: Establishing national research centers for educational

technology innovation to assess the long-term pedagogical and economic impacts of IFP use.

Comparative Analysis with Other Interactive Tools

Comparing IFPs with other digital learning media reveals complementary potential:

- a) Gamified digital learning platforms (e.g., Wordwall, Google Classroom) boost engagement but lack tactile and visual collaboration.
- b) Virtual Reality (VR) and Augmented Reality (AR) tools enhance immersion but remain expensive and less accessible for schools.
- c) IFPs uniquely combine *hands-on interactivity, collaborative engagement, and multimedia integration*, making them practical and scalable for classroom contexts.

Research on AR-based learning in Indonesia showed dramatic improvements in participation and motivation but also noted logistical and training barriers (Lenni & Rohman, 2025). Hence, IFPs offer a more balanced, accessible solution for national-scale adoption.

Policy Implications for the Prabowo–Gibran Era

Integrating IFPs into Indonesia's digital education policy could yield multiple socio-educational benefits:

- a) Enhanced educational equity, bridging rural–urban disparities in access to modern learning technologies.
- b) Improved teacher digital competence, fostering lifelong learning cultures.
- c) Strengthened innovation capacity, supporting Indonesia's long-term human capital development goals.

To realize these outcomes, the government must adopt a multi-sectoral strategy involving ministries of education, communication, and industry, as well as local governments and the private sector.

Table Summary of Findings

Key Dimension	Findings	Supporting Studies
Learning Effectiveness	IFPs significantly improve engagement and outcomes	(Kasa et al., 2024); (Santika & Mushlihuddin, 2025)
Teacher Empowerment	IFP-based teaching enhances classroom control and pedagogical creativity	(Chien, 2024); (Purniningtyas et al., 2024)
Policy Synergy	IFPs align with Prabowo–Gibran’s digital sovereignty agenda	(Suwandi et al., 2024)
Challenges	Infrastructure inequality, cost, and training gaps persist	(Berezina et al., 2021)

The findings collectively suggest that Interactive Flat Panels are not merely digital tools but *transformational enablers* of pedagogical innovation and education policy modernization in Indonesia. Their strategic deployment under the Prabowo–Gibran administration could catalyze a systemic shift toward equitable, high-quality, and technology-integrated education — positioning Indonesia as a leader in *Digital Education in Southeast Asia*.

Conclusion

The study concludes that the Interactive Flat Panel (IFP) plays a pivotal role in advancing Indonesia’s digital learning transformation during the Prabowo–Gibran administration. As an innovative educational medium, IFP enhances classroom interactivity, improves learning outcomes, and supports the government’s vision of *Digital Sovereignty and Education 5.0*.

By fostering collaboration, creativity, and active participation, IFPs bridge the gap between technology and pedagogy, making learning more engaging and inclusive. However, their successful integration requires adequate infrastructure, teacher digital competence, and sustainable policy support.

Therefore, the implementation of IFPs should be strategically embedded in national education programs such as *Smart Schools Indonesia* and *Merdeka Belajar Digital*. If properly executed, IFP adoption will serve as a cornerstone for Indonesia’s educational reform,

empowering teachers and students alike to thrive in a globally connected digital era.

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