

## **Navigating Disruptive Education During the COVID-19 Pandemic: Digital Literacy and Access Challenges**

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**Abstrak:** Pandemi COVID-19 telah membawa dampak yang belum pernah terjadi sebelumnya pada sistem pendidikan global, memicu disrupsi masif yang mengubah paradigma pembelajaran secara drastis dari metode tatap muka tradisional menuju platform digital. Penelitian ini bertujuan untuk menganalisis secara komprehensif aspek-aspek utama dari pendidikan di era disrupsi pandemi, mengidentifikasi tantangan struktural yang muncul, serta mengevaluasi kesenjangan akses yang dialami oleh siswa dengan keterbatasan infrastruktur teknologi. Menggunakan metode library research (studi kepustakaan), data dikumpulkan melalui penelusuran sistematis terhadap artikel jurnal, laporan lembaga internasional dan nasional, serta literatur akademik yang relevan. Hasil analisis menunjukkan bahwa baik pendidik maupun peserta didik menghadapi hambatan literasi digital yang signifikan, yang mencakup pemahaman teknis pengoperasian platform hingga adaptasi pedagogis. Selain itu, kesenjangan infrastruktur digital menjadi krisis utama; siswa di wilayah terpencil atau dari keluarga prasejahtera mengalami marginalisasi akademik akibat ketiadaan akses internet dan perangkat keras yang memadai. Situasi ini menuntut keterlibatan orang tua yang lebih intensif dan adaptasi kurikulum yang berfokus pada esensi pembelajaran. Dampak psikologis berupa kelelahan daring (zoom fatigue), stres, dan isolasi sosial juga menjadi temuan penting yang memengaruhi perkembangan kognitif dan sosial anak. Penelitian ini menyimpulkan perlunya investasi strategis dalam infrastruktur digital dan reformasi kebijakan pendidikan yang adaptif dan inklusif.

**Kata Kunci:** Pendidikan, Era Disrupsi, Pandemi Covid-19, Kesenjangan Digital, Literasi Digital.

**Abstract:** The COVID-19 pandemic has precipitated an unprecedented impact on global educational systems, triggering a massive disruption that has drastically shifted the educational paradigm from traditional face-to-face methods to digital platforms. This study aims to comprehensively analyze the primary aspects of education during the pandemic disruption era, identify emerging structural challenges, and evaluate the access gaps experienced by students lacking adequate technological infrastructure. Utilizing a library research methodology, data were collected through a systematic review of journal articles, reports from international and national institutions, and relevant academic literature. The analysis reveals that both educators and students face significant digital literacy barriers, encompassing technical comprehension of platform operations and pedagogical adaptation. Furthermore, the digital infrastructure gap has emerged as a primary crisis; students in remote areas or from low-income families experience academic marginalization due to the lack of internet access and adequate hardware. This situation necessitates more intensive parental involvement and curriculum adaptations focused on essential learning outcomes. Psychological impacts, including online fatigue, stress, and social isolation, are also critical findings affecting children's cognitive and social development. This study concludes the urgent need for strategic investment in digital infrastructure and inclusive, adaptive educational policy reforms.

**Keywords:** Education, Era of Disruption, Covid-19 Pandemic, Digital Divide, Digital Literacy.

## A. Introduction

The concept of disruption generally refers to a condition in which rapid and fundamental changes within a system or industry cause a significant interruption to traditional methods of conducting activities. In the educational context, disruption translates into substantial shifts in pedagogical methodologies, learning environments, and the fundamental nature of interactions between educators and learners. According to Christensen (1997), disruption typically occurs when simpler, more accessible, and often more affordable innovations begin to supersede complex, traditional, and expensive products or services. Within the educational sphere, this disruptive phenomenon has historically been characterized by a gradual transition from conventional face-to-face instruction toward distance learning, a movement heavily catalyzed by continuous advancements in information and communication technology. However, the organic pace of this technological integration was violently accelerated by an unforeseen global health crisis.

The COVID-19 pandemic, which swept across the globe starting in early 2020, acted as the ultimate catalyst, accelerating this process of disruption at an unprecedented scale. Prior to the pandemic, although technology had begun to be integrated into educational frameworks, a vast majority of educational institutions globally still relied heavily on conventional, synchronous, in-person pedagogical methods. The sudden imposition of social distancing mandates and stringent lockdown policies by various governments, including Indonesia, forced educational institutions to adapt instantaneously to a purely digital landscape. Data published by UNESCO (2020) highlighted the sheer magnitude of this crisis, revealing that nearly 1.6

billion students worldwide were forced to abruptly halt direct teaching and learning activities. This staggering statistic underscores the profound and immediate impact the pandemic exacted upon the global education system, creating an emergency remote teaching scenario that tested the resilience of educational infrastructures everywhere.

The ramifications of the COVID-19 pandemic were not confined solely to the educational sector; they permeated various other crucial domains, including the global economy, healthcare systems, and the socio-cultural fabric of societies. According to a comprehensive report by the World Bank (2020), the pandemic precipitated an unprecedented global recession, characterized by severe negative projections for world economic growth. In developing nations like Indonesia, the educational sector experienced significant shockwaves, primarily manifesting in the loss of access to quality education for millions of students. Data from the Ministry of Education and Culture of the Republic of Indonesia (Kemendikbud) indicated a severe structural vulnerability: approximately 70% of students residing in remote or underserved areas lacked adequate internet access, rendering them entirely disconnected and struggling to participate in synchronous online learning. This technological blackout highlighted a pre-existing digital divide that the pandemic mercilessly exposed and widened.

Simultaneously, the healthcare sector bore an immense burden as it struggled to manage the exponential surge in COVID-19 cases. This healthcare crisis indirectly yet profoundly affected education, as the physiological and psychological well-being of the population deteriorated. Educators, already facing immense

personal and familial pressures, were compelled to adapt to an entirely novel paradigm of online teaching without adequate preparation. A study conducted by Jansen (2021) documented that teachers in Indonesia faced severe difficulties in implementing online learning models primarily due to a critical lack of prior training, insufficient digital pedagogical resources, and inadequate technological infrastructure. This scenario illustrates that the disruption caused by the pandemic did not merely affect students' academic continuity but fundamentally compromised the overall quality of education by placing unsustainable demands on unsupported educators.

From a sociological perspective, the COVID-19 pandemic exacerbated existing socio-economic inequalities, creating a chasm between students from divergent economic backgrounds. Students originating from affluent families generally possessed superior access to high-speed internet, personal technological devices, and supplemental educational resources, allowing for a relatively seamless transition to distance learning. Conversely, students from low-income families were frequently marginalized, lacking the basic prerequisites for digital education. According to a report by UNICEF (2021), the economic fallout of the pandemic placed over 1 million students in Indonesia at severe risk of dropping out of school entirely. The financial devastation experienced by many families meant that education was deprioritized in favor of basic survival, posing a massive challenge for governments and educational institutions striving to design inclusive, equitable, and sustainable solutions for all demographic segments.

Understanding the depth and breadth of educational adaptation and transformation during this era of pandemic-induced disruption is of

paramount importance. The shift from physical classrooms to virtual environments necessitated a complete reimagining of curriculum delivery, assessment methods, and student engagement strategies. The crisis demanded that educational stakeholders not only provide technological hardware but also foster digital literacy—the ability to critically navigate, evaluate, and create information using digital technologies. As schools transitioned to emergency remote teaching, the limitations of simply translating face-to-face lectures into video conferences became glaringly apparent. Pedagogical innovation became a necessity rather than an option, forcing the exploration of asynchronous learning modules, interactive digital media, and hybrid instructional models.

Against this complex backdrop, this research aims to delve deeper into the multifaceted dimensions of education during the COVID-19 disruption. By systematically examining the literature, this study seeks to provide a lucid and comprehensive overview of the myriad challenges and unexpected opportunities that the educational sector encountered. Specifically, this research will analyze the fundamental changes in instructional delivery, evaluate the severe access gaps driven by socio-economic disparities, and identify the emerging innovations and solutions that have the potential to reshape the future of education. The ultimate objective is to formulate evidence-based insights that can inform policymakers, educators, and institutional leaders in their efforts to build a more resilient, adaptive, and equitable educational framework capable of withstanding future crises and ensuring the continuity of learning for all students.

## B. Methods

This study employs a qualitative approach utilizing the library research method. Library research, or systematic literature review, is a rigorous methodological framework that relies on the collection, critical analysis, and synthesis of secondary data derived from previously published academic and institutional sources. In the context of this study, which aims to understand the macro-level systemic disruptions caused by a global pandemic, library research provides the most appropriate avenue for aggregating diverse empirical findings, policy documents, and theoretical discourses into a cohesive narrative. By synthesizing existing literature, this method allows for a comprehensive evaluation of the educational landscape without the temporal and spatial constraints of primary data collection, which was particularly challenging during the pandemic restrictions.

The primary data collection process involved an exhaustive and systematic search of academic databases, digital libraries, and institutional repositories. The search strategy utilized a combination of specific keywords tailored to capture the multidimensional nature of the research topic. Keywords included terms such as "COVID-19 pandemic," "educational disruption," "online learning," "digital divide," "digital literacy," and "education policy in Indonesia." The literature search spanned prominent academic databases, including Google Scholar, Scopus, and ResearchGate, to identify peer-reviewed journal articles and academic books. Furthermore, to ensure the inclusion of current statistical data and policy contexts, the search extended to official reports and publications from highly credible national and international organizations. These included the Ministry of Education and Culture of the Republic of Indonesia (Kemendikbud),

the Central Statistics Agency (BPS), the Association of Indonesian Internet Service Providers (APJII), the World Bank, UNESCO, and UNICEF.

The selection of literature was guided by strict inclusion and exclusion criteria to ensure the validity and relevance of the data. Sources were included if they were published between the years 2019 and 2022, ensuring the data pertained directly to the immediate pre-pandemic context and the height of the global crisis. The selected literature had to explicitly address the impact of COVID-19 on educational systems, with a particular focus on the Indonesian context or relevant global trends applicable to developing nations. Sources that lacked empirical grounding, relied solely on anecdotal evidence, or pertained to unrelated sectors were systematically excluded.

Following the data collection phase, the accumulated literature was subjected to descriptive analytical content analysis. This method involves a systematic coding and categorization process to identify recurring themes, patterns, and contradictions within the literature. The analysis was structured to systematically deconstruct the literature into core thematic areas aligned with the research objectives: the mechanisms of the shift to online learning, the quantification and impact of the digital divide, the psychological and sociological effects on stakeholders, and the policy innovations emerging from the crisis. The final phase of the methodology involved synthesizing these categorized findings into a descriptive-analytical narrative. This narrative structure enables a deep, critical discussion of the data, transitioning from isolated statistics and individual study findings toward a holistic, evidence-based conclusion regarding the state of disruptive education and the necessary future trajectories for educational resilience.

## C. Results and Discussion

### 1. The Transformation of Educational Paradigms and the Shift to Online Learning

The onset of the COVID-19 pandemic necessitated a rapid, almost instantaneous paradigm shift in global educational delivery, transitioning from traditional, physical classroom environments to entirely digital, online ecosystems. This transition was not a planned evolutionary step in educational technology integration but rather an emergency response to an unprecedented public health crisis. According to data released by the Ministry of Education and Culture of the Republic of Indonesia, the mandate to ensure the health and safety of the academic community forced over 60 million Indonesian students and university attendees into emergency remote learning (Kemendikbud, 2020). Consequently, digital communication and learning management systems (LMS) such as Zoom, Google Classroom, Microsoft Teams, and Moodle evolved overnight from supplemental tools into the primary, and often sole, infrastructure for teaching and learning.

The statistical surge in the utilization of these platforms vividly illustrates the scale of this disruption. A report from Google indicated an astronomical 1000% increase in the usage of Google Classroom within Indonesia during March 2020 alone, highlighting the desperate and rapid migration of institutional activities to the cloud (Google, 2020). While this rapid adoption demonstrated a remarkable institutional agility and technological reliance, the transition was fraught with systemic challenges. The forced migration laid bare severe infrastructural inadequacies; countless students, particularly those in rural and socially marginalized areas, encountered insurmountable barriers

regarding internet connectivity and hardware availability. This immediate technological friction exacerbated pre-existing educational inequalities, fundamentally altering the accessibility of learning.

Furthermore, the success of this newly enforced online learning paradigm was inextricably linked to student engagement, a metric that proved highly volatile in virtual settings. Academic research consistently demonstrated that students who maintained active participation in synchronous online sessions exhibited superior academic outcomes compared to their passive counterparts (Wang et al., 2021). However, cultivating such engagement through a screen presented a formidable pedagogical challenge. Educators were compelled to rapidly innovate, seeking ways to establish interactive, supportive, and psychologically safe virtual environments to sustain student motivation—a task made exceedingly difficult by "Zoom fatigue" and the absence of physical social cues.

The monumental shift in delivery mechanisms invariably forced an intensive reevaluation and adaptation of the curriculum and corresponding instructional materials. Recognizing the impracticality of delivering a standard curriculum via emergency remote teaching, the Indonesian Ministry of Education and Culture issued emergency guidelines permitting schools to drastically condense their curricula, focusing exclusively on essential, core competencies (Kemendikbud, 2020). This policy aimed to mitigate cognitive overload for students navigating a novel learning modality while simultaneously reducing the instructional burden on overwhelmed educators. In response to these curriculum adaptations, progressive institutions pioneered flexible, asynchronous learning modules. For instance, several

secondary schools in Jakarta successfully pivoted toward project-based learning frameworks. This approach allowed students to engage in self-directed inquiry with asynchronous digital guidance from instructors via video tutorials and structured online discussion forums (Sari, 2021). Such pedagogical shifts not only facilitated deeper comprehension of core materials but actively fostered critical thinking and autonomous learning skills—competencies highly valued in the 21st-century digital economy.

The pandemic inherently underscored the critical necessity of integrating comprehensive digital skills directly into educational curricula. The World Economic Forum projected that the accelerated digitization of the global economy would displace millions of traditional roles while simultaneously generating approximately 85 million new jobs requiring advanced technological proficiency and digital literacy (World Economic Forum, 2020). Consequently, forward-thinking educational institutions began the complex process of embedding subjects such as data analysis, basic programming, and digital citizenship into their core offerings. Nevertheless, this rapid curricular evolution exposed a critical vulnerability: teacher preparedness. Research indicated a profound skill deficit, with an alarming 60% of educators reporting feeling entirely unprepared to execute this digital transition, citing an urgent need for targeted, intensive professional development in educational technology (Sukma, 2021).

## **2. The Digital Divide and Socio-Economic Challenges in Remote Education**

While the COVID-19 pandemic undoubtedly accelerated the digital transformation of education, it simultaneously illuminated and

drastically widened the pre-existing digital divide, creating a crisis of educational equity. The transition to distance learning inherently assumed a baseline of technological access that simply did not exist for a significant portion of the Indonesian population. Data published by the Central Statistics Agency (BPS) in 2020 revealed a stark reality: approximately 25% of the Indonesian population remained entirely devoid of internet access (BPS, 2020). This infrastructural void meant that a quarter of the population was structurally excluded from participating in any form of effective online education. Furthermore, this digital divide extended beyond mere connectivity to encompass a severe deficit in necessary hardware. A comprehensive survey conducted by the Association of Indonesian Internet Service Providers (APJII) in 2021 disclosed that a mere 40% of students residing in remote or underdeveloped regions possessed access to devices adequate for sustained online learning, such as laptops or reliable smartphones (APJII, 2021).

The consequences of this digital stratification were catastrophic, predominantly penalizing students originating from low-socioeconomic backgrounds. In countless households, multiple school-aged children were forced to share a single, often outdated, mobile device with working parents, or found themselves entirely bereft of any digital access. This systemic deprivation resulted in severe learning loss and academic stagnation. A rigorous study conducted by UNICEF corroborated this grim reality, demonstrating a precipitous and statistically significant decline in academic achievement among students residing in regions characterized by low internet penetration during the pandemic lockdowns (UNICEF, 2021). This data unequivocally proves that the digital

divide transcends a mere lack of hardware; it acts as a structural barrier that fundamentally degrades the quality of education and permanently alters the academic trajectories of vulnerable youth.

The intersection of economic hardship and educational access created an untenable situation for millions. The World Bank estimated that the compounded effects of economic limitations and lacking infrastructure effectively locked out approximately 10 million Indonesian students from the educational system during the pandemic (World Bank, 2020). This staggering figure represents a generational crisis. In specific rural areas, such as isolated regions within Central Java, the lengths to which students went to secure an education highlighted the severity of the crisis. Reports surfaced of students undertaking arduous daily journeys to public spaces, internet cafes, or community centers merely to secure a fleeting internet connection to download assignments. This not only consumed valuable time but imposed additional financial burdens on families already ravaged by the pandemic's economic fallout. Ministry data reinforced this disparity, noting that 30% of students from lower-income brackets reported severe, chronic difficulties in merely attending online classes (Kemendikbud, 2020).

Beyond the tangible hardware and connectivity issues, the disruption severely compromised the qualitative aspects of education, most notably the pedagogical interaction between educators and students. Effective teaching relies heavily on non-verbal cues, immediate feedback, and the cultivation of a supportive interpersonal dynamic—elements that are drastically diluted in a two-dimensional virtual interface. A survey by the Center for Educational Research and Development (Puslitbang) indicated

that 60% of teachers felt their instructional efficacy was severely compromised in the online environment due to the loss of these interactive elements (Puslitbang, 2020). This degradation in instructional quality directly impacted student comprehension and engagement. Furthermore, a study by Universitas Pendidikan Indonesia (UPI) highlighted the profound psychological toll of this disconnected learning environment, revealing that online learners experienced significantly higher rates of alienation, isolation, and diminished intrinsic motivation compared to traditional classroom settings (UPI, 2021).

### **3. Strategic Innovations, Digital Literacy, and Policy Implications**

In response to the multifaceted crises triggered by the pandemic, the educational sector witnessed a rapid emergence of strategic innovations and a critical reassessment of required competencies, primarily centering on the concept of hybrid learning and the urgent necessity for universal digital literacy. As the pandemic's initial shock subsided, institutions began moving away from pure emergency remote teaching toward more structured, sustainable models. Hybrid learning, which systematically amalgamates synchronous face-to-face instruction with asynchronous digital components, emerged as a dominant pedagogical strategy. Recognizing that pure online learning was unsustainable and detrimental to socialization, yet fully acknowledging the ongoing health risks, hybrid models offered a necessary compromise. In Indonesia, the Ministry introduced guidelines allowing schools in safer zones to implement rotational attendance systems, thereby halving physical classroom density while maintaining a continuous digital curriculum for students learning from home (Kemendikbud, 2021). This model theoretically permitted targeted,

individualized support during in-person sessions while leveraging technology for content delivery.

However, the efficacy of these innovative models was entirely contingent upon the digital literacy of the stakeholders involved. The pandemic emphatically demonstrated that providing a device and an internet connection is insufficient; users must possess the cognitive and technical skills to navigate digital environments effectively. A massive global imperative emerged to upskill educators. The World Bank reported that targeted digital pedagogical training directly correlated with significant improvements in online teaching quality (World Bank, 2020). In Indonesia, the government responded by launching the "Guru Belajar" (Teachers Learn) initiative, a massive open online course designed to rapidly enhance the digital competencies of the national teaching workforce, focusing on LMS management, digital content creation, and online assessment strategies (Kemendikbud, 2021).

Equally critical was the need to foster digital literacy among the student population. The International Society for Technology in Education (ISTE) emphasized that digital literacy—encompassing the ability to critically evaluate online information, practice digital etiquette, and protect personal data—is a non-negotiable prerequisite for success in the modern era (ISTE, 2020). The integration of these skills into the formal curriculum shifted from a progressive ideal to an absolute necessity. Statistical evidence from the OECD's Programme for International Student Assessment (PISA) consistently demonstrated a positive correlation between high levels of digital literacy and superior academic performance across core subjects such as mathematics and science, suggesting that digital fluency is a foundational cognitive tool (OECD, 2019).

The long-term implications of this disruption point toward a permanent paradigm shift in educational policy. The rigid, classroom-centric model of the past must evolve into a flexible, technology-enhanced ecosystem that prioritizes lifelong learning. To achieve this, governments must pivot from viewing internet access as a luxury to classifying it as an essential public utility, similar to electricity and water. Massive, sustained investment in digital infrastructure, particularly targeting the 3T regions (Tertinggal, Terdepan, Terluar - Underdeveloped, Frontier, and Outermost areas), is the most critical policy mandate to prevent the permanent entrenchment of educational inequality. Furthermore, educational policies must become highly adaptive, focusing on competency-based curricula rather than rigid standardized testing, and must heavily integrate psychological support systems to address the lingering mental health impacts of the pandemic on the student body (UNICEF, 2021)..

#### **D. Conclusion**

The COVID-19 pandemic induced a seismic disruption across the global educational landscape, fundamentally altering the trajectory of teaching and learning in ways that will resonate for decades. This crisis, while devastating in its immediate impact, served as a global stress test that exposed the deep-seated vulnerabilities and inequities within traditional educational systems. According to UNESCO (2020), the sudden cessation of face-to-face instruction for over 1.5 billion students worldwide catalyzed an involuntary, rapid-scale experiment in distance education. In Indonesia, this disruption affected nearly 68 million students, forcing an abrupt transition to emergency remote teaching that profoundly altered the socio-academic dynamic between educators and learners.

The most glaring and immediate finding of this disruption was the exposure of a severe digital divide. The transition to online platforms ruthlessly marginalized students from lower socio-economic backgrounds and those residing in underdeveloped regions. Data highlighting that 30% of students in remote Indonesian areas lacked adequate internet access underscores a structural crisis where access to technology became the primary gatekeeper to the fundamental right to education. This lack of access, compounded by a widespread deficit in digital literacy among both students and teachers, resulted in significant learning losses, increased dropout risks, and profound psychological distress characterized by isolation and diminished motivation.

However, the pandemic also acted as a powerful crucible for innovation. Educational institutions were forced to abandon archaic practices and rapidly adopt technological solutions. The widespread implementation of digital platforms, the development of flexible, project-based curricula, and the exploration of hybrid learning models represent significant advancements in pedagogical delivery. The crisis highlighted the urgent need for systemic digital upskilling, as evidenced by the 75% of educators who recognized the immediate necessity to enhance their digital competencies (Asosiasi Pendidikan Jarak Jauh Indonesia).

Moving forward, it is evident that the educational paradigm has irrevocably shifted; a complete return to the pre-pandemic status quo is neither possible nor desirable. The future of education lies in the creation of resilient, adaptive, and highly inclusive hybrid ecosystems. To realize this, policymakers must prioritize aggressive, equitable investment in national digital infrastructure, recognizing broadband internet as a fundamental educational utility. Furthermore, digital literacy must

be seamlessly integrated into the core curriculum at all levels, transforming students from passive consumers of technology into critical, responsible digital citizens. Ultimately, the disruption caused by COVID-19 must be leveraged as an unprecedented opportunity to rebuild a more equitable, technologically fluent, and crisis-resistant educational system capable of serving all students in an increasingly digital world.

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