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Digital Schools in Basilan Province: Analyzing Educational Transformation in Conflict-Affected Areas

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Abstract*—This study explores the implementation and challenges of digital schools in Basilan Province, Philippines, a region historically affected by conflict and educational disparities. As the Philippines advances toward educational digitalization, understanding the unique context of Basilan Province becomes crucial for developing effective digital education frameworks. This paper adopts a mixed-methods approach to examine the current state of digital education infrastructure, identify barriers to implementation, and propose a comprehensive framework for digital school transformation in conflict-affected areas. The study reveals significant challenges including limited internet connectivity (34% coverage), inadequate digital infrastructure, and low teacher digital literacy levels (42% proficiency). However, it also identifies opportunities through government initiatives, community partnerships, and innovative mobile learning solutions. The proposed framework emphasizes four key dimensions: infrastructure development, teacher capacity building, community engagement, and adaptive learning solutions. Results indicate that successful digital school implementation in Basilan requires a holistic approach that addresses both technological and socio-cultural factors. The study concludes with recommendations for policymakers, educators, and development partners to support sustainable digital education transformation in conflict-affected regions.*

***Keywords*—** *Digital schools, educational technology, conflict-affected areas, digital divide, teacher training, infrastructure development, Basilan Province*.

I. Introduction

The digital transformation of education has become a global imperative, accelerated by the COVID-19 pandemic and the increasing recognition of technology's potential to enhance learning outcomes [1]. In the Philippines, the Department of Education (DepEd) has implemented various digital education initiatives, including the Basic Education Learning Continuity Plan (BE-LCP) and the Digital Rise initiative [2]. However, the implementation of digital schools in geographically isolated and disadvantaged areas (GIDA) presents unique challenges that require specialized approaches and frameworks.

Basilan Province, located in the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM), represents a critical case study for digital education transformation in conflict-affected areas. With a history of armed conflict, limited infrastructure, and educational disparities, Basilan faces substantial challenges in implementing digital education initiatives [3]. The province has consistently ranked among the lowest in national achievement tests, with only 23% of students meeting satisfactory levels in mathematics and 31% in Filipino language proficiency [4].

Digital schools, defined as educational institutions that integrate digital technologies into all aspects of teaching, learning, and administration, offer potential solutions to address educational challenges in remote and conflict-affected areas [5]. These institutions leverage technology to provide access to quality education, enhance teacher capabilities, and create more engaging learning environments for students [6]. However, the successful implementation of digital schools requires careful consideration of local contexts, infrastructure limitations, and community needs.

The transformation of traditional schools into digital learning environments involves more than just the introduction of technology; it requires a comprehensive approach that addresses infrastructure, human resources, curriculum adaptation, and community engagement [7]. In conflict-affected areas like Basilan, additional considerations include security concerns, cultural sensitivity, and the need for flexible learning modalities that can adapt to varying levels of stability and access. Moreover, there are some studies particularly in Basilan province related to education such leadership style [14], E-learning [15], mental well-being [16], and work-life balance [17].

II. The Problem

Despite national efforts to digitize education in the Philippines, Basilan Province continues to face significant challenges in implementing effective digital schools. The province's unique context as a conflict-affected area with limited infrastructure creates barriers that are not adequately addressed by standard digital education frameworks. Key problems include:

1. Infrastructure Limitations: Limited internet connectivity (34% coverage compared to 71% national average) and unreliable electricity supply (62% electrification rate) [8].
2. Digital Divide: Significant disparities in access to digital devices and internet connectivity between urban and rural areas, with only 28% of households owning computers or tablets [9].

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3. Teacher Preparedness: Low levels of digital literacy among teachers (42% proficiency rate) and limited access to professional development opportunities [10].
4. Security Concerns: Ongoing security issues that affect school operations and limit access to educational resources and training programs [11].
5. Cultural and Linguistic Barriers: Limited availability of digital content in local languages and cultural contexts that resonate with the diverse communities in Basilan [12].

These challenges necessitate a comprehensive understanding of the current state of digital education in Basilan and the development of context-specific frameworks for digital school implementation. This study addresses the research question: "How can digital schools be effectively implemented and sustained in Basilan Province, considering the unique challenges of conflict-affected areas?"

III. Methodology

This study employed a mixed-methods research design to comprehensively examine the current state and potential for digital schools in Basilan Province. The methodology combined quantitative surveys, qualitative interviews, and document analysis to provide a holistic understanding of the research problem.

The study utilized a convergent parallel mixed-methods design, where quantitative and qualitative data were collected simultaneously and analyzed separately before integration [13]. This approach allowed for triangulation of findings and provided a comprehensive understanding of the digital education landscape in Basilan Province.

The study involved 450 participants across three municipalities in Basilan Province: Isabela City, Lamitan City, and Maluso. Participants included:

- School Administrators (n=45): Principals and assistant principals from public elementary and secondary schools
- Teachers (n=285): Teaching staff from various subject areas and grade levels
- Students (n=120): Grades 7-12 students from selected schools

Purposive sampling was used to ensure representation across different geographic areas, school types, and demographic groups. The sample included schools in both urban and rural settings, with varying levels of existing digital infrastructure.

Data collection was conducted over a six-month period (January-June 2023) with appropriate ethical approvals from the Department of Education and local government units. Security protocols were followed, including coordination with local peace and order councils and implementation of safety measures during field visits. Quantitative data were analyzed using descriptive and inferential statistics, including correlation analysis and multiple regression to identify predictors of digital readiness. Qualitative data were analyzed using thematic analysis, with coding conducted by two independent researchers to ensure reliability. Integration of findings was achieved through joint displays and meta-inferences.

IV. Results and Findings

Current State of Digital Infrastructure

The assessment of digital infrastructure in Basilan Province revealed significant gaps and challenges:

TABLE 1: Digital Infrastructure Status in Basilan Province Schools

Infrastructure Component	Urban Schools (%)	Rural Schools (%)	Provincial Average (%)	National Average (%)
Internet Connectivity	67	18	34	71
Computer Laboratories	78	23	42	64
Interactive Whiteboards	45	8	21	38
Reliable Electricity	89	41	62	85
Laptop/Tablet Access	56	12	28	52

The data reveals a significant digital divide between urban and rural schools, with urban schools having substantially better access to digital infrastructure. The provincial averages consistently fall below national benchmarks, indicating the need for targeted interventions.

Teacher Digital Literacy and Readiness

Assessment of teacher digital competencies revealed concerning gaps:

TABLE 2: Teacher Digital Literacy Levels

Competency Area	Proficient (%)	Developing (%)	Beginning (%)
Basic Computer Skills	58	32	10
Internet Navigation	47	38	15
Digital Content Creation	31	45	24
Online Teaching Platforms	25	41	34
Digital Assessment Tools	19	36	45

Only 42% of teachers demonstrated proficient digital literacy across all assessed areas, with significant gaps in advanced competencies such as digital content creation and online teaching platform usage.

Student Access and Engagement

Student access to digital learning resources remains significantly limited across multiple dimensions. Device ownership presents a major barrier, with only 28% of students having access to personal computers or tablets for educational purposes. Internet connectivity poses an even greater challenge, as merely 22% of students have reliable internet access at home, severely constraining their ability to participate in online learning activities. However, mobile phone access tells a different story, with 76% of students having access to smartphones, which have become their primary digital device for accessing educational content. Despite these technological limitations, student attitudes toward digital learning show promise, with 43% of students

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reporting positive attitudes toward digital learning approaches, suggesting that addressing infrastructure barriers could unlock significant educational potential.

Barriers to Digital School Implementation

Thematic analysis of qualitative data identified five major barriers to digital learning implementation. Infrastructure limitations emerged as a primary concern, characterized by unreliable internet connectivity and electricity supply, inadequate computing devices and laboratory facilities, and poor telecommunication infrastructure particularly affecting remote areas. Human resource constraints presented another significant challenge, encompassing limited teacher training in digital technologies, resistance to change among some educators, and insufficient technical support staff to maintain and troubleshoot digital systems. Financial constraints further complicated implementation efforts, with limited budget allocation for digital infrastructure, high costs associated with technology procurement and maintenance, and competing priorities for educational resources creating difficult funding decisions. Security and access issues added another layer of complexity, including safety concerns that affected school operations and training programs, limited access to remote areas for infrastructure development, and frequent disruption of educational activities due to security incidents. Finally, cultural and linguistic factors played a crucial role in barrier formation, particularly the limited availability of content in local languages such as Yakan, Tausug, and Chavacano, cultural resistance to certain types of digital content, and the pressing need for culturally appropriate educational materials that resonate with local communities and learning contexts.

Opportunities and Enablers

Despite the numerous challenges identified, several promising opportunities for digital school development emerged from the analysis. Government support represents a significant enabler, with national digital education initiatives and funding programs providing foundational resources, regional government demonstrating strong commitment to educational transformation, and various partnership opportunities available with national agencies to leverage expertise and resources. Community engagement offers another vital opportunity, characterized by strong community support for educational improvement, active parent and stakeholder involvement in school development initiatives, and local leadership commitment to driving meaningful change. Technological solutions present innovative pathways forward, particularly through mobile learning opportunities that capitalize on widespread smartphone accessibility, expanding satellite internet programs that could bridge connectivity gaps, and solar power solutions specifically designed for remote areas lacking reliable electricity infrastructure. Partnership potential further enhances the opportunity landscape, with international development organizations maintaining an active presence in the region, private sector entities showing genuine interest in educational technology investments, and academic institutions offering valuable collaboration opportunities that could provide technical expertise, research support, and sustainable capacity-building initiatives for long-term digital transformation success.

V. Conclusion

This study reveals that while Basilan Province faces significant challenges in implementing digital schools, there are viable pathways for educational transformation through technology. The research demonstrates that successful digital school implementation in conflict-affected areas requires a comprehensive, adaptive approach that addresses infrastructure limitations, builds human capacity, engages communities, and provides flexible learning solutions.

The proposed ADEFCA framework offers a roadmap for digital education transformation that is sensitive to the unique context of Basilan Province. Key findings indicate that mobile learning solutions, community partnerships, and graduated implementation approaches are essential for success in this challenging environment.

The study contributes to the broader understanding of digital education implementation in conflict-affected areas and provides practical guidance for policymakers and educators working in similar contexts. The research demonstrates that digital schools can be successfully implemented in challenging environments when appropriate frameworks and support systems are established.

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