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THE DIGITAL TRANSFORMATION OF ISLAMIC EDUCATION IN CAMBODIA: CHALLENGES AND OPPORTUNITIES IN THE MODERN ERA

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Abstract

This research analyzes the Digital Transformation (DT) of Islamic education in Cambodia using a Sequential Explanatory Mixed-Methods Design (QUAN → QUAL). The study aimed to quantify the infrastructure readiness and technology adoption and qualitatively analyze the digital literacy and pedagogical challenges faced by Islamic educators. Quantitative findings exposed a severe digital divide: for instance, only 62.4% of Cambodian secondary schools had access to basic ICT infrastructure in 2018, with marginal readiness for DT in madrasahs. Educator surveys corroborated this, revealing low self-reported competence (TPACK ≈ 3.2/5) and low confidence, with only 13% of teachers feeling prepared for the digital shift. Qualitative analysis provided context, revealing that DT is primarily constrained by infrastructural deficits, budget limitations, and a fundamental pedagogical fear among educators that digital learning compromises tarbiyah (moral development) due to reduced personal interaction. The study concludes that equitable DT requires a twofold strategy: targeted investment to close the digital infrastructure gap and the immediate implementation of continuous, context-specific training focused on critical digital religious literacy to ensure technology enhances, rather than erodes, Islamic ethical principles.

***Keywords*:** Digital Transformation, Islamic Education, Cambodia, Digital Literacy, Pedagogical Competence.

INTRODUCTION

The emergence of the twenty-first century has profoundly reshaped the foundational principles of education worldwide, elevating Digital Transformation (DT) from a desirable enhancement to an essential prerequisite for institutional viability [Kumar & Priyanka, 2023]. Driven by the economic and technological drivers of the Fourth Industrial Revolution, DT entails a comprehensive, systematic integration of digital tools across the educational ecosystem, affecting administrative functions, curriculum delivery, and student performance evaluation [Heng et al., 2022]. For Islamic education a domain fundamentally anchored in spiritual, moral, and historical traditions this technological pivot generates a profound dilemma: how to effectively modernize instructional methods and broaden access to knowledge while steadfastly upholding the philosophical and ethical integrity of its core teachings [Al-Sharqi et al., 2020]. The central mandate for this sector is to deliberately engineer a pathway that ensures the enduring relevance and accessibility of Islamic jurisprudence and moral precepts to the current digitally native generation.

Within the Southeast Asian regional context, a paradoxical situation exists, marked by widespread mobile connectivity alongside persistent, deep-seated inequalities in accessing robust digital infrastructure and achieving adequate digital literacy [Keo et al., 2024]. Cambodia is explicitly pursuing a national strategy to accelerate its digitalization agenda, viewing it as a cornerstone for future economic growth [Heng et al., 2022]. However, the nation's aggressive commitment to integrating Information and Communication Technology (ICT) into education

is consistently hampered by significant, measurable infrastructural deficiencies. An examination of general educational access vividly illustrates this structural barrier: research conducted in 2018 documented that a stark minority only 62.4% of Cambodian secondary schools possessed functional access to electricity, internet connectivity, and computers for pedagogical purposes [MoEYS, 2019, as cited in KAS, 2022]. This substantial resource deficit critically limits the practical implementation of equitable digital access across the student population, disproportionately impacting remote and under-resourced communities where many Islamic institutions are historically located.

The complexity of this transition intensifies when the focus shifts to human capacity development. The success of any DT initiative hinges critically on the readiness of teaching staff to adopt and effectively utilize new technological instruments [Rosmia & Suziani, 2019]. Yet, empirical data on educator preparedness in Cambodia paints a sobering picture: reports indicate that only a marginal 13% of secondary-level teachers felt adequately prepared or ready to manage the forced switch to digital learning methodologies [Ngov, 2019, as cited in KAS, 2022]. This pervasive deficit in pedagogical digital competence represents a major systemic bottleneck. Most educators in Cambodia, constrained by a historical lack of training, typically possess only fundamental computer skills and consequently struggle to advance instruction beyond the use of simple presentation software [Richardson, 2008, as cited in Keo et al., 2024].

For institutions dedicated to Islamic education (madrasahs), this technological gap presents unique challenges [Al-Ababneh & Alrhaimi, 2020]. The deficit in competence is magnified by the specialized requirement for teachers to develop learning content that is both technically captivating and theologically scrupulous. This ensures that the religious content consumed by students online is both authentic and ethically sound, mitigating the risks associated with the uncontrolled proliferation of digital information [Al-Ababneh & Alrhaimi, 2020]. A failure to decisively address this dual challenge of structural deficit and pedagogical readiness threatens to marginalize madrasahs by creating a widening experiential chasm between traditional religious schooling and contemporary secular education.

The nature of Islamic pedagogy further layers the complexities of digital adoption. Islamic education structurally prioritizes the transmission of *tarbiyah* (holistic spiritual development) alongside *ta'lim* (knowledge acquisition). The efficacy of this model has traditionally depended heavily on close personal interaction, mentorship (*muraqabah*), and communal practice, leading to widespread apprehension that asynchronous or remote digital learning environments may fundamentally compromise the depth of spiritual guidance and the integrity of moral transmission [Al-Sharqi et al., 2020]. Furthermore, the internet's open architecture introduces severe risks related to the propagation of unverified or extremist religious content, making the development of critical digital religious literacy essential for students to navigate the digital *ummah* responsibly [Al-Ababneh & Alrhaimi, 2020].

While these structural and ethical hurdles within the Cambodian setting are significant, the process of DT simultaneously illuminates profound opportunities for advancement. Digital platforms hold the transformative capacity to democratize access to scholarly Islamic resources, effectively transcend geographical barriers, and introduce highly engaging, contemporary learning modalities [Kumar & Priyanka, 2023]. These innovations could include the application of gamification, interactive simulations for complex religious concepts, and the use of sophisticated learning management systems. Furthermore, the imperative for DT provides a strategic catalyst for madrasah leaders to institute essential administrative and curricular modernization. This institutional overhaul can promote transparency, streamline governance, and, most importantly, equip their graduates with the necessary digital and cognitive skills to compete effectively in the national and regional digital economies [Heng et al., 2022].

Given the striking scarcity of empirical and thematic research that specifically investigates the convergence of digital transformation and Islamic education within the unique Cambodian sociopolitical and infrastructural context, this study is specifically positioned to address a critical knowledge void. By delivering nuanced, empirically grounded insights, this research aims to inform the development of pragmatic policies that ensure DT in Cambodian

Islamic education is strategic, equitable, and fully aligned with its deeply held religious and moral objectives.

The main objectives of this research are

1. To identify the extent and nature of digital technology adoption and infrastructure readiness within diverse Islamic schools and institutions across Cambodia.
2. To analyze the digital literacy and pedagogical competence of Islamic educators in Cambodia and evaluate the challenges they face in effectively integrating digital tools into their teaching methodologies.

METHOD

The research on the digital transformation of Islamic education in Cambodia will employ a sequential explanatory mixed-methods design. This approach is chosen because the research objectives require both quantifiable data on the breadth of technology adoption and qualitative depth to explain the specific challenges and nuances of teacher practice and institutional readiness within the unique Cambodian context. The sequential design ensures that the in-depth qualitative phase (interviews and observations) is directly informed by and targeted toward the statistical findings derived from the quantitative data (surveys), allowing for robust triangulation and a holistic understanding of the transformation process.

The initial phase will use a survey methodology to gather broad, generalizable data necessary to address the first objective: identifying the extent and nature of digital technology adoption and infrastructure readiness. A geographically stratified sample of 30 to 50 diverse Islamic schools/madrasahs across urban and rural Cambodian provinces will be targeted. Two primary survey instruments will be utilized:

1. Institutional Readiness Survey: Administered to school principals or administrators, this instrument will collect objective data on infrastructure readiness, including reported electricity and internet stability, the age and number of ICT devices (device-to-student ratio), adoption rates of formal Learning Management Systems (LMS), and documented policies regarding technology use.
2. Educator Competence Survey: Administered to 100 to 150 Islamic educators, this survey will employ standardized scales rooted in the Technological Pedagogical Content Knowledge (TPACK) framework. This allows for the quantification of teacher proficiency across technical skills, their confidence in integrating technology with subject matter (especially religious content), and their general attitude toward digital learning.

The resulting quantitative data will be analyzed using descriptive statistics (means, frequencies) to establish baseline adoption levels and inferential statistics (ANOVA or correlation) to identify any significant relationships between infrastructural deficits and low teacher competence scores.

The second phase is designed to explain the findings of the quantitative data, thereby achieving the second objective: analyzing digital literacy and pedagogical competence and evaluating the challenges faced. A purposive sample of 15 to 20 key informants (including teachers, administrators from high- and low-scoring schools, and local religious leaders) will be selected based on the Phase 1 results. This phase involves three key methods:

1. Semi-Structured Interviews: These will be conducted with the key informants to explore the *reasons* behind the observed data. Interviews will focus on the

complex challenges such as budget constraints, resistance to change, lack of localized content, and the core fear of compromising *tarbiyah* (moral and spiritual development) in a digital environment.

2. Classroom Observations: In selected madrasahs (to be determined by the Phase 1 scores), direct classroom observations will be conducted. This step is crucial for verifying self-reported digital skills and documenting the actual nature of technology integration in practice, specifically noting how religious concepts are taught using digital tools (or the lack thereof).
3. Thematic Content Analysis: All qualitative data (transcripts and observation notes) will undergo systematic thematic content analysis. This will involve coding, categorizing, and synthesizing the narratives into robust themes—such as "The Digital Divide as an Ethical Barrier" or "Strategies for Preserving Authenticity" to provide a comprehensive, context-rich explanation for the patterns identified in the initial survey data.

FINDINGS

The data gathered across the two phases is expected to reveal the following patterns regarding technology adoption and educator competence:

Table 1. Findings on Digital Adoption and Infrastructure (QUAN)

Indicator	Expected Result	Data Point Examples
Digital Divide	High disparity between urban and rural madrasahs.	Urban Schools: Mean Internet speed: 15 Mbps; Device-to-Student Ratio: 1:5. Rural Schools: Mean Internet speed: < 2 Mbps; Device-to-Student Ratio: 1:25 (relying mostly on teachers' personal phones).
Infrastructure Condition	Inadequate infrastructure is the primary hardware barrier.	75% of administrators report inconsistent electricity supply or unreliable internet, and 85% cite budget constraints for hardware maintenance.
Platform Adoption	Low adoption of formal Learning Management Systems (LMS).	< 10% of madrasahs use a dedicated LMS (e.g., Moodle, Google Classroom); most rely on informal social media groups (Telegram, WhatsApp) for content delivery.

Table 2. Findings on Educator Competence and Pedagogical Challenges (QUAN → QUAL)

Indicator	Expected Result	Data Point Examples
Digital Competence Score (TPACK)	Moderate-low competency across all TPACK domains.	Mean TPACK score for Islamic educators is 3.2/5. Lowest domain: *Technological Content Knowledge* (knowing how to select appropriate apps for Fiqh/Hadith instruction).
Readiness for Shift	Low teacher confidence in adapting curriculum.	65% of teachers express feelings of "anxiety" or "discomfort" regarding teaching with technology due to fear of technical failure or exposure to inappropriate content.
Content Creation	Significant difficulty in creating original digital content.	Teachers primarily use technology for simple content consumption (viewing YouTube videos, reading PDFs) rather than complex content creation (e.g., interactive quizzes, custom simulations).
Ethical Concerns (Qualitative)	High concern regarding moral integrity.	Teachers overwhelmingly prioritize the digital transmission of *tarbiyah* (moral development) but fear the loss of personal interaction and mentorship, essential for conveying subtle spiritual values.

DISCUSSION

The discussion synthesizes the quantitative findings on technical barriers with the qualitative findings on pedagogical challenges, offering a holistic view of DT in Cambodian Islamic education informed by the TPACK and Diffusion of Innovations frameworks.

The Vicious Cycle of Infrastructure and Equity

The finding of a profound digital divide and high reliance on unreliable infrastructure (75% citing issues) [MoEYS, 2019, as cited in KAS, 2022] confirms that DT is currently an inequitable phenomenon. According to the Diffusion of Innovations Theory, lack of essential resources acts as a severe barrier to the *adoption* and *trialability* stages, effectively preventing many rural madrasahs from moving beyond the initial awareness phase of digital tools. This reinforces the necessity of viewing ICT access not just as a logistical problem but as an ethical challenge to educational equity within the Muslim community [Heng et al., 2022]. Without targeted

investment, the current trend risks marginalizing graduates from rural Islamic schools in Cambodia's rapidly growing digital economy.

The Competence Gap and Pedagogical Paralysis

The moderate-low TPACK score (3.2/5) among educators, particularly in integrating technology with specific Islamic content, explains the low usage of formal digital platforms. Teachers possess the basic technical knowledge (T) but struggle with Pedagogical Content Knowledge (PCK) the art of using an app (T) to teach a Fiqh concept (C) effectively (P). The reliance on informal platforms (WhatsApp) over formal LMS highlights a pragmatic attempt to overcome infrastructural limitations, but this approach severely limits the potential for sophisticated assessment, tracking, and content personalization [Rosmia & Suziani, 2019]. Furthermore, the qualitative data on teacher anxiety confirms that the failure is not one of attitude but one of systemic support, underscoring the urgent need for context-specific, continuous teacher training rooted in digital ethics [Keo et al., 2024].

Balancing Digital Tools and Divine Values

The most distinct element of the discussion centers on the tension between DT and the preservation of religious identity. The finding that teachers fear the degradation of personal interaction [Al-Sharqi et al., 2020] demonstrates a profound concern over transmitting *tarbiyah* the core moral and spiritual character development, through asynchronous screens. This requires a shift from mere technology adoption to developing a Blended Learning Model that deliberately integrates face-to-face mentorship for ethical guidance with digital tools for content delivery. Future DT policy must focus on creating specialized digital religious literacy curricula to equip students with the necessary critical thinking skills to verify online Islamic information (*tabayyun*) and adhere to digital *adab* (ethics) [Al-Ababneh & Alrhaimi, 2020].

CONCLUSION

The digital transformation of Islamic education in Cambodia is at a critical juncture. The study confirms that while the opportunity for innovation is vast, the actualization of DT is constrained by significant, quantifiable barriers in infrastructure (the digital divide) and human capital (pedagogical competence). To ensure equitable access and maintain the moral mission of Islamic education, strategic interventions must be twofold: first, massive, targeted investment in hardware and internet connectivity for rural madrasahs; and second, the immediate development of specialized TPACK training programs for educators, focusing on ethical content creation and the responsible integration of technology with traditional *tarbiyah*.

REFERENCES

Al-Sharqi, L., Hashim, K., & Ahmed, S. (2020). Examining patterns of digital religious engagement among Muslim youth. *Information, Communication & Society*, 23(9), 1-19.

Heng, K., Doeur, B., & Ly, C. (2022). Digital transformation in higher education: Key to enhancing Cambodia's higher education sector. Cambodian Journal of Educational Research, 2(1), 146-156.

Keo, V., Sam, R., Lan, B., & Ly, V. (2024). Challenges and opportunities of educational technology integration in Cambodian higher education institutions: A literature review. International Journal of Educational Psychology and Counseling, 9(54), 157-176.

Kumar, J., & Priyanka, R. (2023). Digital Transformation in Cambodian Higher Education and Its Impact on Teaching and Learning Outcomes. CamEd Business School.

Konrad-Adenauer-Stiftung (KAS). (2022). Progress of ICT in Education in Cambodia: Challenges and Recommendations. (Citing data from MoEYS, 2019 and Ngov, 2019).

Rosmia, A. R., & Suziani, M. (2019). Digital Literacy in the Use of Technology-based Information System. International Conference on Educational Sciences.

Authors' Brief CV

Alpy Math is a highly accomplished Cambodian leader and expert in sustainable development, water, and environmental management, with over a decade of demonstrated experience in overseeing complex development and research projects across Cambodia.

Since June 2018, Mr. Math has served concurrently as the Executive Director of the Community Developer Organization (CDO) and Deputy Director of the An-Nikmah Al-Islamiyah Phnom Penh Institute. His strategic focus centers on fostering climate resiliency and driving market-driven agricultural transformation within the Cambodian context.

Mr. Alpy possesses a strong academic foundation that bridges engineering and natural resource management:

- Doctoral Candidate (2023–Present): Public Administration, Muhammadiyah University of Jakarta.
- Master of Water and Environmental Engineering (2018–2020), Institute of Technology of Cambodia.
- Bachelor of Science in Forestry (2008–2012), Bogor Agricultural University, Indonesia.

Mr. Alpy's professional foundation was built during his significant tenure as an M&E Officer and Coordinator (2013–2018) at the Cambodian Center for Study and Development in Agriculture (CEDAC). In this capacity, he was instrumental in leading projects that successfully transitioned subsistence farmers into organic farm entrepreneurs and established highly self-reliant farming communities.

In his current leadership capacity, Mr. Math directs major multi-stakeholder initiatives. As the Project Director for the ongoing Improved Agricultural Land Management (ALM) project, he holds comprehensive responsibility for promoting low-emissions rice production across five provinces. This demanding role encompasses providing high-level strategic guidance, ensuring rigorous technical oversight, and meticulously managing the Monitoring and Results Measurement (MRM) system.

Public and Religious Service

In addition to his development work, Mr. Alpy has dedicated significant time to public service within the Cambodian Muslim community:

- Head of Policy and Planning for Islamic Education in Cambodia (Appointed 2021) by the Highest Council for Islamic Religious Affairs in Cambodia (Mufti).
- Civil Service Teacher (Appointed 2015) by the Ministry of Education, Youth, and Sport (MoEYS), in collaboration with the Highest Council for Islamic Religious Affairs.