

Implementing Quizizz Paper Mode for Digital Learning in Marginal Education Settings: A Case Study in Malaysia

Nida Khoirunnisa^{a)}, Oman Hadiana^{b)}, Tio Heriyana^{c)}, Nanan Abdul Manan^{d)}, Nur Azizah^{e)}

Universitas Muhammadiyah Kuningan, Kuningan, Indonesia

^{a)}Corresponding author: nidaakhoirunnisa7@gmail.com

^{b)}hadianaoman@umkuningan.ac.id

^{c)}heriyantio@upmk.ac.id

^{d)}nanan@upmk.ac.id

^{e)}nurazizah@umkuningan.ac.id

ABSTRACT

Indonesian diaspora students in overseas non-formal centers face pedagogical disengagement due to high activity, short attention spans, and limited digital infrastructure. Baseline observations revealing 4–5 minute attention fragments highlight a critical gap: current educational digitalization assumes stable internet and 1:1 device ratios, neglecting low-resource contexts. This program implements and evaluates Quizizz Paper Mode as an adaptive, low-infrastructure digitalization strategy. Employing a participatory qualitative-descriptive design, the intervention integrates structured gamified quizzes via physical barcode cards across three systematic phases. Observational metrics demonstrate significant shifts: participation exceeds 96%, sustained attention extends to ~12.8 minutes, and automated scoring reduces grading time by >70% with 98% accuracy. These findings prove that meaningful digitalization relies on pedagogically structured interaction design, not hardware proliferation. The program contributes a replicable evidence-based framework for inclusive assessment, offering broad implications for transforming marginalized community learning into interactive, sustainable academic spaces.

ARTICLE INFO

Article History:

Submitted/Received: 21 April 2026

First Revised: 26 April 2026

Accepted: 29 April 2026

First Available online: 30 April 2026

Publication Date: 30 April 2026

Keyword :

Quizizz Paper Mode

Digital Learning

Gamification

Educational Technology

INTRODUCTION

Education for Indonesian children residing abroad, particularly at non-formal learning centers such as Sanggar Bimbingan (SB) At-Tanzil Cheras, Malaysia, plays a pivotal role in safeguarding the educational rights and cultural continuity of diaspora youth. However, educators in these settings frequently encounter pedagogical challenges stemming from the distinct psychosocial profiles of their students, who typically exhibit high activity levels but relatively short attention spans. When coupled with predominantly conventional, lecture-based instructional methods and severely limited access to digital infrastructure, these conditions often precipitate rapid student disengagement and diminished learning motivation. Empirical observations across four Indonesian community learning centers in Kuala Lumpur reveal that educators frequently exhibit limited competency in instructional design and pedagogical development. Consequently, the prevailing teaching methods tend to be conventional, monotonous, and insufficiently innovative, a reality that further exacerbates student disengagement in these resource-constrained settings (Utami et al., 2023). While the integration of educational technology is widely recognized as a catalyst for creating dynamic, contemporary learning environments, existing digitalization initiatives in community-based overseas education remain predominantly infrastructure-dependent. Despite the proliferation of interactive learning platforms, current implementations largely presuppose reliable internet connectivity and one-to-one device accessibility—conditions that are frequently unattainable in marginal or non-formal learning contexts. Consequently, a critical gap exists in both the literature and practice: there is a lack of empirically grounded, low-infrastructure digital interventions that systematically address the pedagogical mismatch between students' high-energy, short-attention characteristics and traditional teaching methods, while simultaneously accommodating institutional resource constraints in overseas community learning centers. This gap is particularly salient given evidence from comparable low-resource contexts, where gamified interventions have demonstrated significant potential to enhance student engagement without heavy infrastructure dependency (Preciado Asanza et al., 2024).

To address this gap, this community service program explicitly aims to implement and evaluate Quizizz Paper Mode as an adaptive, low-infrastructure digitalization strategy in a resource-constrained non-formal education setting. Specifically, the program objectives are threefold: (1) to enhance student engagement, motivation, and sustained attention through gamified, device-independent assessment mechanisms; (2) to streamline instructional workflows and reduce manual grading burdens via automated, real-time scoring systems; and (3) to evaluate the operational feasibility and scalability of a low-infrastructure digital tool in a multigrade learning environment. By leveraging Quizizz Paper Mode—a feature that enables digital quiz participation through physical barcode cards scanned by a single teacher device—this initiative functions as a strategic "digital bridge" that circumvents hardware limitations while preserving the interactive and competitive advantages of game-based learning. Ultimately, this program seeks to demonstrate how context-responsive technological integration can foster a modern, positively competitive, and cognitively stimulating learning atmosphere in marginalized educational environments, while establishing a practical, easily replicable framework for integrating digital assessment into routine instructional practices.

METHOD

This community service program was implemented using a participatory educational approach integrated with a qualitative descriptive design to ensure contextual relevance and long-term

sustainability. The intervention was conducted at Sanggar Bimbingan (SB) At-Tanzil Cheras, Malaysia, involving the center's teaching facilitators and all enrolled students, who represent a mixed-age cohort typically spanning grades 1 to 6—a condition commonly encountered in overseas community learning centers due to limited human and infrastructural resources. Before implementation, administrative approval and informed consent were obtained from the center management and participating educators to uphold ethical standards of voluntary participation. The intervention followed a systematic three-phase cycle comprising preparation, execution, and evaluation. During the preparation phase, the team conducted contextual classroom observations and intensive coordination with administrators to align quiz content with the existing curriculum, followed by the design and printing of individualized physical barcode cards for each student. The selection of Quizizz Paper Mode was strategically grounded in its demonstrated efficacy in device-limited educational settings, where physical barcode cards enable inclusive digital assessment without requiring individual student gadgets (Cahyati & Maisaroh, 2023). The execution phase centered on pedagogical integration and operational deployment, wherein facilitators received structured onboarding sessions on quiz design, barcode scanning protocols, and real-time feedback utilization. Structured game-based quiz sessions were subsequently integrated into regular learning hours. To ensure smooth implementation and address technical queries during initial deployment, follow-up support was provided through asynchronous digital communication and printed operational guidelines—a mechanism empirically shown to enhance feature adoption and minimize instructional disruption (Al Adawiyah et al., 2024). This implementation component directly operationalizes the principle that low-infrastructure digital tools must be seamlessly embedded into existing teaching routines to achieve immediate pedagogical utility.

Data were collected through methodological triangulation, combining structured classroom observations, semi-structured focus group discussions (FGDs) with facilitators and students, and automated system analytics generated by the Quizizz platform. Qualitative data from field notes and FGD transcripts were analyzed using thematic analysis following established coding protocols to identify patterns in student engagement, pedagogical feasibility, and perceived shifts in learning motivation. Concurrently, quantitative indicators such as real-time scoring accuracy, response frequency, and task completion rates were processed using descriptive statistics to supplement the qualitative insights. This complementary analytical framework was systematically applied to enhance the construct validity, reliability, and transferability of the program's outcomes, ultimately yielding an evidence-based implementation model tailored to the operational realities of resource-constrained overseas community learning centers.

RESULTS

Implementation Trajectory & Baseline Context

Initial classroom mapping revealed a mixed-age cohort (grades 1–6) with fragmented attention spans and high physical restlessness. Baseline observations documented an average sustained attention of 4–5 minutes during conventional instruction, with off-task behaviors recorded at 65.2%. These baseline dynamics align with evidence that multigrade, low-resource classrooms inherently exhibit higher cognitive fragmentation and behavioral off-task rates before structured digital intervention (Abdalla et al., 2023). Manual assessment workflows required approximately 150 minutes per week per facilitator. Following curriculum alignment and distribution of individualized barcode cards, eight structured Quizizz Paper Mode sessions were integrated into regular learning hours. Platform analytics, observational rubrics, and structured FGD transcripts were systematically logged to capture implementation outcomes.

Measurable Shifts in Student Engagement & Cognitive Focus

Quantitative indicators derived from system analytics and time-on-task observation sheets demonstrated consistent upward trajectories:

- Participation Rate: Increased from 72.4% (baseline) to 96.3% by Session 8.
- Sustained Attention: Extended from 4–5 minutes to an average of 12.8 minutes during quiz cycles.
- Response Accuracy: Rose from 58.1% (pre-intervention practice) to 84.2% (Session 3) and stabilized at 87.6% (Session 8).
- Off-Task Behavior: Declined to 18.3% by the final observation cycle.

Participation Rate increased from 72.4% (baseline) to 96.3% by Session 8, while Response Accuracy stabilized at 87.6%. These measurable shifts corroborate recent evidence that Quizizz Paper Mode significantly enhances behavioral participation and cognitive accuracy in device-limited elementary classrooms by synchronizing physical interaction with immediate digital feedback (Cahyati & Maisaroh, 2023). Qualitative field notes corroborated these metrics, noting heightened kinesthetic responsiveness, peer-to-peer academic prompting, and reduced gadget-related distractions. These observable shifts align with recent evidence that Quizizz Paper Mode significantly enhances multidimensional student engagement by synchronizing physical interaction with immediate digital feedback (Putra et al., n.d.).

Operational Efficiency & Assessment Workflow Transformation

System-generated scoring logs and facilitator time-tracking sheets revealed substantial workflow optimization:

- Manual Grading Time: Reduced by 73.3% (from ~150 mins to ~40 mins weekly).
- Scoring Accuracy: System analytics recorded 98.1% match with manual verification samples.
- Task Completion Rate: Averaged 91.7% across all age tiers, with minimal abandonment.
- Adoption Confidence: 89.4% of facilitators rated “high readiness” to deploy Paper Mode independently in subsequent terms, based on post-implementation FGD coding.

System-generated scoring logs and facilitator time-tracking sheets revealed substantial workflow optimization: Manual Grading Time reduced by 73.3% (from ~150 mins to ~40 mins weekly), with system analytics recording 98.1% match with manual verification samples. These efficiency gains corroborate recent empirical evidence that automated digital quiz platforms consistently reduce teacher administrative workload by 60–80% while maintaining >95% scoring accuracy, directly enabling data-driven instructional pacing (Kohnke et al., 2023). Facilitators emphasized the immediacy of analytics dashboards: “Before, I spent evenings checking papers. Now, the results appear instantly, and I can immediately regroup students who struggle with specific concepts.”

DISCUSSION

Gamification Mechanics as Catalysts for Multidimensional Engagement

The observed surge in participation (96.3%) and attention extension (12.8 mins). Quizizz Paper Mode simultaneously activated: (a) behavioral engagement through kinesthetic card orientation and synchronized scanning; (b) emotional engagement via low-stakes competitive framing that channeled

high energy into academic focus rather than disruption; and (c) cognitive engagement through immediate visual feedback loops that reinforced correct responses and triggered error correction. These mechanisms operationalize gamification design principles, particularly progression feedback and meaningful choice architecture. Unlike gadget-dependent platforms that often fragment attention through multitasking or notifications, Paper Mode's physical-digital hybrid sustains focus by externalizing interaction into a shared, time-bound ritual. This finding substantiates (Preciado Asanza et al., 2024), who argue that context-adapted gamification outperforms high-tech alternatives in resource-constrained classrooms by minimizing cognitive fragmentation and maximizing synchronous participation.

The “Digital Bridge” Paradigm and Low-Infrastructure Inclusion

The stabilization of response accuracy at 87.6% across multigrade cohorts challenges the prevailing assumption that digital learning requires a 1:1 device ratio. This finding substantiates recent empirical evidence that Paper Mode directly improves cognitive outcomes while advancing inclusive education goals in resource-constrained settings, demonstrating that equitable access does not depend on hardware intensity but on pedagogical design (Rizoq & Purwandari, 2025). By decoupling participation from personal gadget ownership, Quizizz Paper Mode functions as a digital bridge (Al Adawiyah et al., 2024), converting infrastructural scarcity into an opportunity for equitable engagement. This aligns with recent regional studies demonstrating that context-adapted digital assessment models offer high replicability across diverse non-formal education settings in Southeast Asia (Widyasari & Jeniva, 2025). Conceptualization of the digital divide not merely as hardware access, but as participatory inclusion. The barcode-scanning mechanism ensures that all learners, regardless of socioeconomic background, experience synchronous interactivity, real-time validation, and data-driven pacing. Consequently, the intervention transforms a structural limitation (device scarcity) into a pedagogical advantage (unified attention, reduced screen fatigue, and collaborative pacing), demonstrating that inclusive digitalization is achievable through design simplicity rather than capital intensity.

Cognitive Load Reduction, Workflow Optimization, and Sustainable Integration

The 73.3% reduction in manual grading time and 98.1% scoring accuracy reflect a significant alleviation of extraneous cognitive load for educators. Automated analytics redirect facilitator attention from administrative processing to formative intervention, enabling real-time differentiation for struggling learners. Technology Acceptance Model (TAM), wherein perceived usefulness and effort expectancy strongly predict sustained adoption. The high facilitator readiness score (89.4%) indicates that Paper Mode's low technical threshold and immediate pedagogical payoff lower adoption barriers typically associated with educational technology. This aligns with extended TAM frameworks, suggesting that workflow compatibility and frictionless integration are stronger predictors of sustained adoption than perceived usefulness alone in low-resource contexts (Rosenthal et al., 2025). By embedding assessment automation into routine instruction rather than treating it as an isolated add-on, the program fosters workflow-compatible digitalization—a critical factor for scalability in marginal learning centers where teacher turnover and resource volatility are common.

Theoretical Implications for Marginal Learning Environments

Collectively, these findings propose a replicable framework for low-infrastructure digital transformation: Contextual Alignment → Gamified Low-Device Delivery → Automated Feedback → Reflective Integration. The program demonstrates that engagement, accuracy, and efficiency gains do not depend on hardware proliferation but on pedagogical scaffolding and interaction design. The

stabilization of response accuracy at 87.6% across multigrade cohorts suggests that low-infrastructure gamification can support not only behavioral engagement but also cognitive development. This aligns with findings that Paper Mode, when integrated into problem-based learning frameworks, significantly enhances students' critical thinking and learning outcomes, demonstrating its pedagogical versatility beyond simple assessment (Zalukhu et al., 2024). Future research should examine longitudinal impacts on knowledge retention, subject-specific adaptability, and cross-institutional scalability. Nonetheless, this implementation affirms that context-responsive gamification can bridge the digital participation gap while preserving instructional coherence in overseas community learning settings.

CONCLUSION

This community service program successfully demonstrated that Quizizz Paper Mode functions as a viable, low-infrastructure digitalization strategy for multigrade, resource-constrained learning centers. By decoupling interactive assessment from personal device dependency, the intervention significantly enhanced student engagement, extended sustained attention spans, and reduced off-task behaviors, while simultaneously streamlining instructional workflows through automated, real-time scoring. The high operational feasibility and facilitator readiness scores further confirm the scalability of this gamified, barcode-based approach in overseas community education settings. Theoretically, these findings reinforce the efficacy of context-responsive gamification and hybrid physical-digital interaction in mitigating infrastructural limitations without compromising pedagogical quality. Practically, the program provides a replicable framework for integrating inclusive digital assessment into routine teaching practices. Future implementations should examine longitudinal impacts on knowledge retention, subject-specific adaptability, and cross-institutional deployment. Ultimately, Quizizz Paper Mode demonstrates that meaningful learning digitalization in marginalized educational environments depends not on hardware proliferation, but on pedagogically grounded, accessibility-driven design.

ACKNOWLEDGMENTS

The authors would like to express their gratitude to all parties who supported the smooth execution of this community service activity. We thank the leadership of Universitas Muhammadiyah Kuningan for their support, which enabled the activity to run successfully. We also extend our gratitude to the Principal of the Indonesian School Kuala Lumpur (SIKL), Malaysia, and ALPTK PTMA as our collaborative partners, particularly in the field of community service. Furthermore, we would like to thank the management of Sanggar Bimbingan At-Tanzil Cheras Malaysia for their technical assistance during the implementation of this program.

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