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Research Article

Educational Systems in the Age of Digital Media: The Experience of Schools Without Walls

Adil Bashar Adil[a*]
adil.bshar@alnoor.edu.iq
ORCID:0009-0008-0841-5717

[a]Alnoor Center for Linguistic Studies, Alnoor University, Mosul, 41012, Iraq

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Abstract:

This conceptual paper employs a framework-driven theoretical synthesis to examine the transformation from institution-bound education to networked, "schools without walls" models. Drawing on postdigital theory, empirical studies of learner media practices, and policy-level initiatives, the paper argues that effective implementation depends not on technological provision alone but on systemic alignment among assessment, pedagogy, and equitable access. The study identifies persistent structural barriers, including misaligned assessment systems, uneven digital access, and insufficient pedagogical support. It concludes that "schools without walls" should be conceptualized as a comprehensive institutional redesign rather than a technological shift.

Keywords: digital media; virtual learning environments; schools without walls; digital communication; learner autonomy

1. Introduction

1.1 Background

Digital revolution has reshaped the educational framework from a rigid, institution-bound configuration to networked learning ecosystems that operate across varied settings and time-based structures. UNESCO conceptualizes this reconstitution as a comprehensive undertaking: digital innovation possesses the potential to broaden accessibility and inclusion,

* Corresponding author
E-mail address: adil.bshar@alnoor.edu.iq

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elevate the caliber of learning, bolster educational governance, and enable the supervision of educational processes (UNESCO, 2024). The upheaval precipitated by the COVID-19 pandemic further highlighted the critical need to align technological infrastructure with human capital to establish equitable, flexible, and resilient educational systems (UNESCO, 2024).

Within this scholarly context, the notion of "schools without walls" embodies the proposition that educational experiences can be organized beyond the boundaries of the traditional classroom through the utilization of technology-mediated interaction and online learning spaces. Postdigital scholarship contends that the act of deconstructing "walls" extends far beyond merely shifting pedagogy to an online format; rather, it necessitates a far-reaching systemic restructuring of learning environments, organizational structures, and socioeconomic realities (Forsler et al., 2025). This critical lens is especially relevant as it emphasizes the significance of institutional architecture and justice-oriented considerations, rather than marginalizing technology to the status of a peripheral component.

1.2 Problem Statement

Despite the expanded availability of technological tools, a considerable number of instructional systems remain anchored to teaching approaches and assessment mechanisms that reflect a marked divergence from learners' technology-driven interactions. Studies employing digital usage logs indicate that although modern digital tools blur the boundaries between institutionalized and out-of-school learning environments, an enduring disconnect exists between children's digital participation in home environments and their application of technology within academic settings (Meier & Kaspar, 2024). When educational institutions fail to meaningfully integrate students' established technology habits into course design and evaluation frameworks, the outcome frequently manifests as shallow incorporation of tools rather than meaningful improvements in learning achievements.

A further systemic obstacle concerns the issue of digital equity. Extensive investigations demonstrate that a considerable proportion of both students and teaching professionals remain affected by insufficient internet access and are deprived of the essential technological equipment required for sustained online education. Addressing these inadequacies calls for a coordinated strategy toward policy development and a dedication to long-term financial commitment. In the absence of such initiatives, the concept of "schools without walls" may unintentionally exacerbate entrenched inequalities rather than expanding learning opportunities (Chandra et al., 2020).

1.3 Significance and Contributions

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This article advances the scholarly discourse in three principal dimensions. First, it reconceptualizes "schools without walls" as a systemic concern rather than a mere technical or physical transition. It then synthesizes a postdigital theoretical framework with research-based evidence on technology engagement patterns within and beyond formal educational environments to elucidate why merely migrating to digital tools fails to address the deep-rooted incongruence between the lived experiences of technology-mediated education and prevailing institutional frameworks. Third, it frames equitable digital access as a foundational element of institutional architecture rather than a matter of deferred execution, underscoring its implications for evaluation mechanisms, pedagogical capacity building, and scholastic technological foundations.

1.4 Research Questions

1. How do technology-mediated platforms and online educational ecosystems reconfigure academic structures in the direction of "schools without walls"?
2. What research-based findings substantiate the disconnect between students' technology engagement patterns within institutional settings and those observed in domestic and informal contexts?
3. What structural prerequisites — encompassing digital justice, institutional support structures, pedagogical capability, and evaluation restructuring — underpin the viability of effective schools-without-walls frameworks?
4. What transferable lessons may be derived from formally catalogued programs and real-world operational case studies?

2. Theoretical Framework

This study synthesizes three mutually reinforcing pedagogical orientations with the construct of "schools without walls" with the aim of critically analyzing not only the integration of technology-based resources but also whether institutional architecture sustains substantive and enduring knowledge acquisition pathways.

2.1 Constructivism (Piaget; Vygotsky)

Constructivism posits that understanding is dynamically shaped through firsthand engagement and interpersonal exchange. Within boundary-free educational configurations, experience-based tenets are commonly operationalized by means of real-world activities, cooperative inquiry, and the jointly constructed production of technology-mediated outputs with fellow learners spanning varied settings and geographical spaces.

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2.2 Connectivism (Siemens)

Connectivism posits that understanding is dispersed throughout interconnected systems and that knowledge acquisition unfolds through the practice of traversing, establishing, and reconfiguring relational ties among networked nodes. Boundary-free educational configurations resonate with this theoretical orientation by foregrounding technology-based systems and collaborative discourse as the focal point of engagement and collective meaning-making, reorienting emphasis away from delivering instructional material toward cultivating associative ties and co-creating intellectual frameworks.

2.3 Self-Regulated Learning (Zimmerman)

Self-regulated learning delineates how academic agents strategize, oversee, and engage in metacognitive review of their scholastic endeavors. Technology-mediated educational spaces can reinforce these cognitive operations by rendering participation and academic trajectory transparent and by furnishing prompt and individualized formative input. Within exploratory frameworks, student self-directedness is contingent upon systematically organized guidance structures rather than the mere availability of technological tools.

3. Literature Review and Field Tensions

3.1 Digital Transformation as a Systems Challenge

UNESCO underscores that technological advancement holds the capacity to broaden equitable provision and inclusivity, elevate academic pertinence and caliber, and consolidate educational oversight and supervisory mechanisms (UNESCO, 2024). Nevertheless, a systemic viewpoint also necessitates consideration of regulatory frameworks, workforce competency, and organizational restructuring. The superficial implementation of digital tools, in the absence of coherence with instructional methodologies and evaluation mechanisms, seldom results in enduring scholastic progress.

3.2 Postdigital Classrooms: Beyond "Moving Online"

Postdigital academic discourse frames the "classroom without walls" as a reconstitution of educational environments and conceptual frameworks, as opposed to merely a transition across technology-based infrastructures (Forsler et al., 2025). This theoretical standpoint redirects scrutiny away from the integration of technological resources toward the configuration of academic functions, organizational practices, appraisal frameworks, and socioeconomic realities that define instructional landscapes.

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3.3 In-School vs. Out-of-School Media Practices

Digital usage log investigations reveal that students progressively encounter dissolved demarcations across institutionalized and non-institutional digital settings. Notwithstanding, educational institutions frequently neglect to capitalize on learners' routine digital engagement patterns when constructing instructional engagements (Meier & Kaspar, 2024). This misalignment implies that conventional evaluation frameworks and institutional practices may inadvertently reinstate scholastic boundaries, regardless of whether technology-based applications have been provisioned.

3.4 Digital Equity and the Risk of "Wall-Less Inequality"

Equitable digital access constitutes not simply an operational concern but a foundational structural prerequisite. Common Sense Media and the Boston Consulting Group approximate that roughly 30% of publicly enrolled pupils in the United States were deprived of adequate network access or technological equipment for meaningful remote education amid the global health crisis, underscoring the magnitude of resource allocation necessary to bridge these deficiencies (Chandra et al., 2020). In the absence of justice-oriented strategic design, schools-without-walls configurations run the risk of evolving into exclusionary frameworks, inequitably privileging students who are already equipped with more extensive computing infrastructure.

3.5 Applied Initiatives as Design Cases (with Critical Appraisal)

Documented initiatives illustrate how “wall-less” schooling can be operationalized and where it commonly encounters limitations.

3.5.1 Flat Classroom: Global Collaboration

Flat Classroom initiatives link spatially dispersed learning environments through jointly pursued research initiatives and cooperative technology-mediated creation, with the purpose of cultivating international awareness and cooperative abilities among learners (Lindsay & Davis, 2013).

Analytical evaluation. What it facilitates: genuine intercultural cooperative engagement and the collective construction of technology-mediated products that resonate with experience-based pedagogical tenets. What it leaves unresolved: considerable temporal requirements, disparate digital communication readiness across collaborating academic organizations, and a heavy reliance on educators' instructional guidance capabilities. In the absence of evaluation restructuring, international cooperative endeavors may persist as supplementary pursuits rather than fundamental educational engagements. Why it matters: the advantages of collaboration expand exclusively under conditions where instructional goals, educator assistance frameworks, and evaluative standards deliberately recognize collective meaning-making.

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3.5.2 SMILE: Inquiry and Feedback Loops through Mobile Learning

SMILE (Stanford Mobile Inquiry-based Learning Environment) encourages learner-initiated inquiries through portable technological tools, with student-to-student cooperative reasoning and collaborative appraisal frameworks reinforced through educator oversight to cultivate investigative thinking and scholastic involvement (Kim et al., 2011).

Analytical evaluation. What it facilitates: systematically organized investigative mechanisms and developmental evaluative response systems that can strategically underpin autonomous academic development. What it leaves unresolved: reliance on consistent technological availability and educators' competency to interpret and act upon educational data insights. In resource-constrained settings, operationalization may become sporadic. Why it matters: exploratory learning frameworks necessitate consistent engagement and continuous pedagogical support; failing this, the proclaimed advantage of "anytime, anywhere learning" runs the danger of evolving into an experience that is sporadically available to a privileged few.

3.5.3 OER4Schools: Teacher Capacity-Building for Interactive Pedagogy

OER4Schools is a freely accessible, multi-modal educator development initiative conceived to advance participatory, investigative pedagogical approaches and collective knowledge construction, encompassing the deployment of portable digital tools and openly available instructional content (University of Cambridge Faculty of Education, n.d.; Habler et al., 2020).

Analytical evaluation. What it facilitates: continuous pedagogical competency enhancement through actionable teaching methodologies and unrestricted learning resources, which are fundamental to comprehensive institutional transformation. What it leaves unresolved: wider institutional impediments such as instructional burden, school-level managerial endorsement, and governance-driven inducements. Educator development endeavors may not materialize in instructional reality without conducive organizational circumstances. Why it matters: "schools without walls" necessitate system-wide pedagogical growth, implying that instructional capacity advancement ought to be complemented by institutional backing frameworks and evaluative oversight systems.

Here is the paraphrased paragraph using the suggested vocabulary in academic style:

3.5.4 ConnectED: Infrastructure at the Policy Level

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ConnectED was a nationally sponsored government-driven program inaugurated in 2013 to furnish network connectivity to 99% of students through advanced digital infrastructure within a five-year timeframe, achieved by means of E-Rate enhancement and collaborative governmental and corporate arrangements (The White House, 2013).

Analytical evaluation. What it facilitates: acknowledgment that internet access serves as an indispensable structural foundation for present-day academic frameworks. What it leaves unresolved: coherent integration among digital resource systems, instructional methodology, and appraisal frameworks, nor the institutional capability of educational establishments to leverage enhanced network access in support of substantive academic achievements. Why it matters: financial commitment to digital foundations is indispensable yet inadequate alone; governance-driven endeavors must align network enhancements with educator capacity building and evaluation restructuring.

To consolidate the principal features of these initiatives, Table 1 outlines their primary emphasis, instructional processes, merits, and constraints.

Initiative	**Main Focus**	**Learning Mechanism**	**Strengths**	**Limitations**
Flat Classroom	Global collaboration	Project-based collaboration between international classrooms	Develops global competence and teamwork	Requires strong coordination
SMILE	Inquiry learning	Student-generated questions with peer feedback	Encourages inquiry and engagement	Depends on device access
OER4Schools	Teacher professional development	Interactive pedagogy and collaborative learning	Improves teacher capacity	Requires institutional support
ConnectED	Digital infrastructure	Broadband connectivity expansion	Expands access to technology	Limited direct pedagogical change

3.6 Synthesis: A Field Debate Worth Making Explicit

An enduring controversy across the scholarly landscape is technological determinism — the conviction that dissolving geographical limitations will inherently enhance scholastic attainments. Nevertheless, the research-based findings examined in this study support a more tempered interpretation. While technology-based applications can broaden academic possibilities, institutional "walls" frequently resurface in alternative configurations throughout various scholastic arrangements. These encompass (a) evaluation frameworks that

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disproportionately favor solitary, time-bound demonstration, (b) educator function assumptions oriented toward knowledge transmission rather than pedagogical guidance, and (c) asymmetrical provision of digital assets, which fundamentally shapes who is able to engage substantively within technology-mediated educational spaces.

From an academic standpoint, the core contention is that boundary-free scholastic engagement proves effective solely when educational systems reconceptualize the recognized parameters of legitimate knowledge acquisition, the mechanisms through which academic progress is appraised, and who is institutionally empowered to contribute meaningfully.

Here is the paraphrased paragraph using the suggested vocabulary in academic style:

4. Conceptual Framework: Schools Without Walls as System Redesign

This paper advances a theoretical structural framework that establishes coherence among technological foundations, engagement patterns, and scholastic attainments, while foregrounding digital justice and evaluative coherence as indispensable prerequisites:

Technology-mediated platforms, technology-facilitated interaction, and web-based instructional spaces foster geographically dispersed engagement, cooperative meaning-making, and evaluatively responsive educational frameworks (UNESCO, 2024).

Schools without walls — understood as an institutional and instructional planning framework — orchestrate learning across varied settings through collaborative undertakings, investigative mechanisms, and jointly utilized virtual environments.

Scholastic attainments and student self-directedness are elevated when evaluation mechanisms, pedagogical capability, and inclusively designed resource systems are coherently arranged; failing this, the advantages of technology-mediated education persist as inequitably distributed (Chandra et al., 2020).

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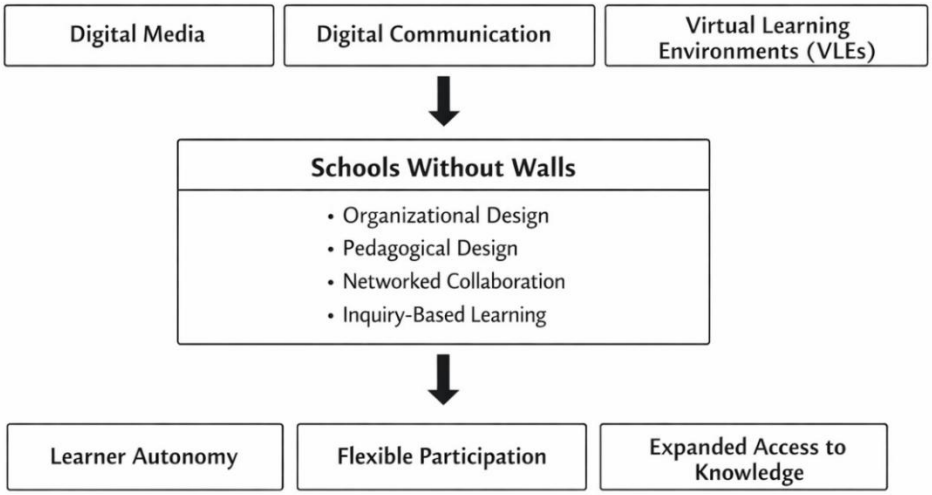

Figure 1. Schools Without Walls as a System Redesign Model.

Technology-mediated platforms, technology-facilitated interaction, and web-based instructional spaces foster scholastic engagement transcending conventional site-based environments. Schools without walls operate as an institutional and instructional reconfiguration orchestrating cooperative engagement and investigative exploration across varied settings. Evaluative coherence and equitable digital access serve as indispensable structural determinants governing scholastic attainments, as opposed to being treated as deferred operational matters.

To elucidate the foundational components of the advanced theoretical model, Table 2 consolidates the principal elements of the boundary-free educational framework and their contributions to determining academic results.

Table 2. Key Components of the Schools Without Walls System.

System Component	**Description**	**Educational Role**
Digital Infrastructure	Digital media, communication tools, and virtual learning environments (VLEs)	Enables distributed learning and interaction across contexts
Learning Design	Project-based learning, inquiry-based activities, and collaborative tasks	Facilitates active knowledge construction and networked collaboration
Institutional Conditions	Teacher capacity, governance structures, and curriculum alignment	Supports the implementation and sustainability of innovative learning models
Assessment Alignment	Portfolios, performance-based assessment, and rubric-based evaluation	Recognizes collaborative work and inquiry-based learning outcomes
Digital Equity	Connectivity, devices, and support	Ensures inclusive participation in

	services	digital learning environments
Learning Outcomes	Learner autonomy, collaboration skills, and expanded access to knowledge	Represents the educational impact of schools-without-walls models

5. Methodology

5.1 Research Design

The study employs a framework-driven theoretical integration. It synthesizes research-based findings from three complementary strands with the aim of deriving institutional structural recommendations: (1) postdigital theoretical literature on the reconstitution of educational environments (Forsler et al., 2025), (2) field-based investigation into students' technology engagement patterns (Meier & Kaspar, 2024), and (3) governance-driven operational records derived from programs targeting cooperative engagement, investigative educational approaches, educator capacity building, and connectivity frameworks (e.g., Lindsay & Davis, 2013; Kim et al., 2011; Haßler et al., 2020; The White House, 2013).

Here is the paraphrased paragraph using the suggested vocabulary in academic style:

5.2 Units of Analysis

The focal elements of examination encompassed: (a) academic contentions pertaining to postdigital instructional spaces, (b) field-derived data on students' technology engagement patterns within institutional settings and in informal and domestic contexts, and (c) structural premises and facilitative circumstances inherent in formally catalogued operational examples.

5.3 Analytical Procedure

A systematically organized categorical assessment schema was employed to identify principal evaluative categories, comprising framework aims, instructional architecture, engagement dynamics, educator and participant functions, appraisal benchmarks, fairness presuppositions, and connectivity necessities. Conceptual consolidation was directed toward four investigative dimensions: the dissolution of demarcations between institutionalized and non-institutional educational settings, facilitative mechanisms for student self-directedness, coherence of evaluation mechanisms, and circumstances pertaining to equitable digital access.

5.4 Trustworthiness and Limitations

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Scholarly rigor was bolstered through multi-source corroboration across conceptual frameworks, field-based investigations, and governance-driven operational records. Several delimitations warrant recognition. First, the study does not represent an original field-based assessment of one particular operational setting. Second, the methodological soundness and breadth of field-derived data diverge across the examined instances. Third, setting-dependent organizational and resource-based limitations may shape the transferability of conclusions. Notwithstanding these constraints, the outcomes are theoretically transferable in that they illuminate consistently appearing structural prerequisites that reliably facilitate or impede the realization of boundary-free educational frameworks across varied academic environments.

6. Findings

6.1 'Without Walls' as Organizational and Pedagogical Redesign

Post-digital viewpoints indicate that the fundamental shift is not the removal of the material environment, but rather the reconceptualization of educational arrangement, functions, and physical circumstances (Forsler et al., 2025). Accordingly, the primary structural inquiry becomes: which organizational practices and evaluative frameworks require transformation for interconnected educational modalities to be institutionally acknowledged and valorized?

Here is the full text rewritten using the suggested synonyms, maintaining academic style:

6.2 The Formal/Informal Learning Disconnect Remains Entrenched

Research findings indicate that students' routine digital engagements are not inherently transformed into pedagogical assets within formal educational environments. Even where digital equipment is available, instructional application tends to be restricted, while learners often regard informal digital interaction as more relevant and purposeful (Meier & Kaspar, 2024). This finding suggests that closing the divide requires instructional and evaluative reconceptualization rather than simply increasing device availability.

6.3 Fairness as a Structural Limitation

Inclusive engagement depends on consistent network access, availability of technological tools, and ongoing organizational backing for both students and educators. The scale of the domestic digital divide documented by Common Sense Media and the Boston Consulting Group underscores that significant

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structural resource allocation is required to prevent the perpetuation of entrenched disparities (Chandra et al., 2020).

6.4 Four Operational Strategies (and Their Breakdown Conditions)

Collaboration strategies (e.g., global cooperative projects) are effective when collaborative work is formally evaluated and adequately structured; otherwise, they tend to deteriorate into discretionary supplemental pursuits.

Inquiry strategies (e.g., student-generated questioning) succeed when engagement is consistent and evaluative responses are implementable; otherwise, they risk declining toward irregular and fragmented learning activities.

Educator capacity strategies (e.g., continuous pedagogical development initiatives) are effective when institutional circumstances support instructional transformation; otherwise, uptake remains precarious.

Infrastructure strategies (e.g., broadband connectivity initiatives) succeed when implemented in conjunction with teaching improvement and appraisal restructuring; otherwise, improvements in network access do not inherently result in substantive educational achievements.

7. Discussion: Implications for System Design

7.1 Assessment Redesign as the ‘Real Wall’

Throughout the analyzed instances, evaluation reveals itself as the most entrenched systemic barrier. When appraisal systems remain predominantly structured around solitary, time-bound tests, technology-mediated cooperative work and investigative pedagogical approaches are insufficiently rewarded. Therefore, structural reformation ought to broaden the application of competency-oriented evaluation approaches, including curated learning records and criterion-referenced appraisal of collectively produced outputs and exploratory methodological sequences.

Here is the paragraph rewritten using the suggested synonyms, maintaining academic style:

7.2 Educator Capacity Development as a Fundamental Structural Component

Pedagogical professional development ought to be regarded as an essential systemic foundation rather than a peripheral supplement. Initiatives such as OER4Schools demonstrate how application-focused materials can facilitate participatory and investigative instructional approaches (Haßler et al., 2020).

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However, wider structural determinants — including administrative backing, workload allocation frameworks, organizational motivators, and designated collaborative working intervals — fundamentally govern whether professional development materializes as enduring instructional implementation.

7.3 An Inclusion-Centered Approach: Averting Inequity Within Ostensibly Open Educational Systems

Inclusivity ought to take precedence over digital advancement. While consistent network access and device availability constitute indispensable preconditions for engagement, technological fairness also encompasses enabling frameworks such as technological guidance, universally available instructional content, and adaptive provisions that take into consideration students' domestic circumstances. In the absence of these facilitative arrangements, boundary-free instructional frameworks may inequitably favor students from privileged backgrounds who are already resourced with established structural privileges (Chandra et al., 2020).

7.4 Connecting Institutional and Non-Institutional Learning Without Naive Valorization

Reconciling school-based and everyday learning experiences ought not to entail uncritically incorporating leisure-driven activities straightforwardly into formal learning spaces. Rather, it necessitates constructing pedagogical tasks that capitalize on commonly used media modalities — such as concise digital expositions or collective digital creation — while upholding clearly defined academic expectations, evaluative response systems, and appraisal standards. The objective is to reconstitute routine digital engagement into scholastically significant educational experiences without diminishing the integrity of either domain.

7.5 Avenues for Forthcoming Scholarly Inquiry

Subsequent investigation ought to: (a) triangulate digital activity logging approaches with in-situ instructional monitoring to more comprehensively examine how habitual digital activity can be reconstituted as pedagogical assets; (b) assess evaluative restructuring initiatives that formally acknowledge cooperative and investigative educational achievements; and (c) systematically investigate technological inclusion programs as causative determinants conditioning scholastic results, rather than solely as peripheral environmental variables.

8. Concluding Remarks

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Boundary-free educational institutions constitute a viable pathway for present-day scholastic frameworks amid the prevailing technological era, fostering adaptable, cooperative, and investigative educational engagement spanning varied settings. However, the findings consolidated within this investigation reveal that structural barriers endure in less apparent manifestations, including incongruent evaluative systems, inadequate educator competency, and inequitable provision of network infrastructure and technological tools. Consequently, the concept of boundary-free educational institutions ought to be conceptualized as a form of comprehensive institutional reformation rather than simply a surface-level digital reconfiguration (Forsler et al., 2025).

9. Actionable Recommendations (Governance, Institutional Administration, and Pedagogical Application)

- Governance: Technological fairness — encompassing consistent network access, device provision, and assistive provisions — ought to be regarded as an indispensable common resource and financed as a critical institutional backbone for scholastic systems (Chandra et al., 2020).
- Appraisal: Institutional practice must orient toward competency-demonstration evaluation frameworks — including task-centered assignments, curated evidence collections, and criterion-referenced appraisal — that formally acknowledge collectively produced outputs, investigative methodological sequences, and cyclical knowledge construction.
- Educator Capacity Building: The reach of continuous, application-focused pedagogical development initiatives ought to be systematically upscaled, and organizational frameworks must safeguard dedicated periods for collegial professional engagement (Haßler et al., 2020).
- Implementation Governance: Connectivity programs must be harmonized with instructional reconceptualization and evaluative system reconfiguration; provision-first, impact-deferred enactment models are to be firmly eschewed.
- Institutional Design: Organizational practices ought to be established that incorporate students' routine digital engagements into intellectually demanding scholastic activities with transparently stated appraisal standards and evaluative response systems (Meier & Kaspar, 2024).

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Bio Note:

Adil Bashar Adil is a graduate of the Department of English, College of Education at Al-Noor University, Mosul, Iraq. He is an emerging researcher with a growing interest in English language teaching (ELT), digital learning, applied linguistics, and educational technology. In addition to his research activities, he works in a technical and administrative capacity across several academic journals affiliated with Al-Noor University, where he contributes to manuscript preparation, formatting, and publication processes. He is also actively involved in the Alnoor Center for Linguistic Studies, supporting academic and research initiatives.

Contact Information:
Alnoor Center for Linguistic Studies,
Al-Noor University, Mosul, 41012, Iraq
Email: adil.bshar@alnoor.edu.iq
ORCID: https://orcid.org/0009-0008-0841-5717