Journal of Scientific and Human Dimensions
مجلة الأبعاد العلمية والإنسانية
Volume 2, Issue 2, 2026 Pages: 1120-1128
Journal homepage: https://jshd.com.ly/index.php/jshd/en

An Exploratory Study of the Ethical Challenges and Infrastructure Constraints in AI Integration in Libyan Higher Education

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دراسة استكشافية للتحديات الأخلاقية ومعوقات البنية التحتية لدمج الذكاء الاصطناعي في مؤسسات التعليم العالي الليبية

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Received: April 29, 2026	Accepted: May 25, 2026	Published: June 21, 2026

Abstract:
Artificial intelligence is driving a fundamental structural change, yet Libyan academia frequently misreads this upheaval as a simple software upgrade, chasing efficiency while side-stepping the severe ethical fallout. By examining the national institutional grid, this review exposes a volatile dynamic. A growing demand for digitisation is colliding with decaying physical infrastructure and a significant lack of in regulatory policy. The unchecked saturation of AI tools across student populations actively accelerates systemic institutional decay. Deployed without strict oversight, these systems erode academic integrity, normalise mass surveillance, and allow opaque, Western-centric biases to infiltrate core assessments. Forcing these hyper-optimised global models into a recovering post-conflict environment engineers a modern intellectual dependency. Local epistemologies are immediately marginalised, effectively drowned out by foreign algorithms completely blind to regional cultural nuances. Moving beyond purely descriptive critiques, this study engineers a multi-stage integration architecture tailored to bypass existing administrative blockades. The proposed blueprint demands that digital adoption be firmly anchored within indigenous philosophical frameworks, enforcing strict moral accountability. If institutions hope to survive this rapid technological transition and secure true intellectual sovereignty, they must rapidly execute a culturally resilient computational strategy.

Keywords: Academic Integrity, AI Integration, Algorithmic Bias, Ethical Challenges, Infrastructure Constraints, Intellectual dependency, Libyan Higher Education.

الملخص
يعمل الذكاء الاصطناعي على تسريع التحول المعرفي العميق؛ ومع ذلك، فإن المجتمع الأكاديمي في ليبيا كثيرًا ما يسيء فهم هذا التحول الكبير، حيث ينظر إليه على أنه مجرد تحسين سطحي للبرامج يهدف إلى تحقيق الكفاءة التشغيلية، مع إهمال تداعياته الأخلاقية الكبيرة .توضح هذه المراجعة، من خلال تحليل الإطار المؤسسي الوطني، حالة من عدم الاستقرار المؤسسي. يقف الحماس المتزايد للتحول الرقمي في تناقض صارخ مع تدهور البنية التحتية المادية والغياب شبه الكامل للأطر التنظيمية والتشريعية.
إن الانتشار غير المقيد لأدوات الذكاء الاصطناعي بين الطلاب يسرع بالفعل التفكك المنهجي للإطار المؤسسي .عندما يتم استخدام هذه الأدوات دون رقابة صارمة، فإنها تقوض النزاهة الأكاديمية، وتجعل من المراقبة الشاملة أمراً اعتيادياً، وتسهل تسلل التحيزات الغامضة المتجذرة في النماذج

الغربية إلى العمليات الأساسية للتقييم الأكاديمي .إن فرض هذه النماذج العالمية المتقدمة على بيئة ما بعد الصراع التي لا تزال في طور التعافي يولد نوعًا معاصرًا من التبعية الفكرية، حيث يتم تهميش المعرفة الأصلية بسرعة وإغراقها من قبل الخوارزميات الأجنبية التي تُظهر فهمًا سطحيًا للفوارق الثقافية والإقليمية.
وبالانتقال إلى ما هو أبعد من مجرد التحليلات الوصفية النقدية، يقترح هذا البحث إطارًا متعدد الأوجه لدمج الذكاء الاصطناعي، مصممًا خصيصًا للتغلب على العوائق الإدارية الحالية .يعتمد الإطار المقترح على ضرورة تضمين اعتماد التقنيات الرقمية ضمن نماذج فلسفية محلية أصيلة لضمان وضع معايير صارمة للمساءلة الأخلاقية .إذا كانت المؤسسات التعليمية تهدف إلى التخفيف من تداعيات هذا الاضطراب التكنولوجي والحفاظ على استقلاليتها الفكرية الحقيقية، فيجب عليها أن تنفذ على الفور استراتيجية حوسبة قابلة للتكيف ثقافيًا وتستجيب لخصوصيات السياق المحلي.

الكلمات المفتاحية: النزاهة الأكاديمية، دمج الذكاء الاصطناعي، التحيز الخوارزمي، التحديات الأخلاقية، قيود البنية التحتية، التبعية الفكرية، التعليم العالي الليبي.

Introduction

The integration of artificial intelligence necessitates a significant epistemological shift. We are witnessing a structural recalibration of academic mechanics, rather than a benign software update. The very architectures dictating how institutions generate, evaluate, and distribute knowledge now operate under fundamentally altered paradigms (Khan, 2024). Mid-twentieth-century tutoring systems merely hinted at this trajectory. Today, the rapid proliferation of generative large language models (LLMs) alongside sophisticated neural machine translation (NMT) frameworks fundamentally alters the foundational syntax of pedagogical interaction and administrative governance (Shrif & Jamoum, 2025).

Across global higher education, computational intervention is frequently embraced with limited critical oversight, as administrative efficiency and adaptive learning pathways are prioritised over ethical foresight. Institutions increasingly harvest large-scale datasets for predictive analytics, chasing exponential gains in university efficiency metrics (Bates et al., 2020; Farooqi et al., 2024). The ideological commitment is remarkable. Extensive empirical polling among educational practitioners validates this technological pivot, returning phenomenally high approval scores for adaptive algorithms and cementing a fierce international consensus on automated pedagogy (Shrif & Jamoum, 2025).

Unmediated computational adoption precipitates immediate ethical liabilities. These latent architectural vulnerabilities actively dismantle the exact educational equity they theoretically guarantee (Khatri & Karki, 2023). Training sophisticated machine learning models demands aggressive data harvesting. This absolute dependency on vast datasets provokes intense, unresolved disputes regarding informed consent, intellectual privacy, and the quiet normalisation of pervasive student surveillance (Sclater, 2017). This dependency introduces a structural risk. Foundational architectures rely almost exclusively on historical corpora skewed heavily toward affluent Western demographics. We face a highly documented, severe probability that artificial intelligence will permanently embed opaque algorithmic prejudices within core academic evaluation, executing a modernised digital linguistic imperialism (Guido, 2025; O'Neil, 2016).

The Middle East and North Africa (MENA) region absorbs this technological shockwave unevenly. Deeply entrenched systemic barriers actively distort immense theoretical opportunities (Al-Zahrani & Alasmari, 2025). High-income Arab states deliberately accelerate their digital transitions by wiring specialised algorithmic platforms directly into national strategic planning. Regional efficacy remains glaringly asymmetrical. Libya occupies a highly volatile crossroads. The state manages intense post-conflict recovery alongside severe economic restructuring, forcing the higher education sector into extreme precarity (Lashhab & Shniba, 2026). Digital integration within Libyan universities historically survived only as disjointed, theoretical administrative automation (Shrif & Jamoum, 2025). Chronic physical deficits—specifically unreliable municipal power grids and erratic broadband access—dictate this stagnation, even as global technological velocity forces a pedagogical rupture. Exogenous pressures, combined with targeted institutional interventions like the May 2023 UNICEF inclusive education partnership and the July 2024 ICESCO strategic initiative, finally compelled AI into active teaching methodologies (Faiz & Alsheky, 2026; Shrif & Jamoum, 2025).

Despite the establishment of recent international strategic partnerships, the integration of educational technology within Libya remains severely constrained by systemic, on-the-ground infrastructural deficits. Younger student populations exhibit sharp digital fluency. This digital fluency contrasts sharply with an institutional apparatus constrained by extreme infrastructural, financial, and regulatory blockades (Faiz & Alsheky, 2026; Kasheem et al., 2025). This Critical Analytical Review investigates a specific, highly problematic intersection. Reflexive algorithmic consumption now occurs within an absolute vacuum of ethical or physical safeguards. We systematically synthesise existing empirical data to dissect the precise moral liabilities of AI deployment across these institutions. This study evaluates the severe infrastructural constraints dictating daily usage before engineering a sovereign, strategic integration framework.

2. Literature Review & Theoretical Framework

To adequately evaluate the systemic challenges facing the Libyan higher education sector, the analysis must be securely anchored in the theoretical frameworks defining Artificial Intelligence in Education (AIEd). The fundamental drive of AI in education is the relentless pursuit of adaptive learning systems—architectures designed to dynamically adjust user interfaces, instructional content, and pedagogical pacing based on the real-time cognitive and behavioural profiles of individual learners (Khatri & Karki, 2023).

2.1 Intellectual Privacy Versus Surveillance Capitalism

Top-down mandates currently dictate global computational ethics. Supranational architectures, notably the European Union's General Data Protection Regulation alongside UNESCO's (2022) directives, aggressively enforce algorithmic transparency and data minimisation while mandating comprehensive human oversight (Dignum, 2019; Selwyn, 2022). These stringent regulatory frameworks legally codify the right to explanation. Critical scholarship exposes a darker operational reality. The theoretical lens of 'surveillance capitalism' critically undermines these regulatory frameworks, exposing how digital infrastructures systematically extract raw human experience to fuel opaque commercial prediction markets (Zuboff, 2024).

Institutional pedagogy absorbs this extractive logic through continuous, opaque student monitoring. Universities rapidly deploy biometric proctoring software and behavioural tracking algorithms under the guise of defending academic integrity. They systematically transform the learning environment into a digital panopticon. Consequently, intellectual privacy is severely compromised. While administrators defend these surveillance architectures as mandatory security upgrades, the technology actively subverts foundational classroom power dynamics and significantly diminishes learners' intellectual autonomy (Farooqi et al., 2024). The psychological damage is significant as algorithmic hyper-vigilance generates acute clinical anxiety, severe stress, and a total collapse of institutional trust among the monitored student populace (Khan, 2024).

2.2 Epistemic Injustice and Digital Linguistic Imperialism

Generative architectures harbour severe structural prejudices. Neural machine translation (NMT) frameworks systematically default to Anglo-American syntax, as the vast text corpora underpinning these foundational models originate almost exclusively within the geopolitical boundaries of the United States and the United Kingdom, forcing computational outputs to systematically favour Western socio-pragmatic values (Taher, 2025). Scholarship isolates this phenomenon as epistemic injustice. Dominant algorithmic infrastructures aggressively overwrite indigenous conceptual lexicons. Marginalised demographics subsequently lose the institutional vocabulary required to articulate systemic harm, watching their localised knowledge structures dissolve under the weight of imported hegemonies.

Global processing models severely distort regional linguistics. Confronted with the immense contextual density of Arabic—specifically the intricate syntactic realities of Libyan dialects—these predictive engines operate as crude, reductive instruments that categorise local sociolinguistic markers merely as statistical anomalies requiring rigid correction toward a sterile, Western-centric baseline (Elmahdi et al., 2025). Consequently, the uncritical adoption of these algorithms risks embedding a form of digital colonialism, wherein students are pressured to conform to external norms, thereby compromising local academic autonomy and marginalising regional cultural identities to satisfy the rigid mathematical demands of foreign machine learning systems (Guido, 2025; Taher, 2025).

2.3 Localised Moral Frameworks: Virtuous Ethical Conduct

Importing global technological ethics into the Libyan context demands absolute structural alignment with indigenous moral frameworks. Institutional legitimacy relies entirely on this synthesis. Regional epistemologies dictate that deploying advanced computational infrastructure remains strictly subordinate to the doctrine of virtuous ethical conduct, a foundational philosophy commanding that scholarly inquiry and technical application actively elevate human character, enforce social accountability, and uphold human dignity (Ashour & Banihani, 2025).

Current academic discourse within Libya challenges the reductive classification of artificial intelligence as merely a utilitarian instrument engineered solely for administrative acceleration. This presents an acute moral hazard, if left unregulated, unmediated algorithmic integration threatens to erode independent cognition and normalise profound intellectual lethargy across the student populace. Subordinating digital pedagogy to virtuous ethical imperatives guarantees that computational power strictly serves human moral expansion, deliberately subverting the highly extractive, transactional logic characterising modern surveillance capitalism (Ashour & Banihani, 2025).

2.4 The Moderated Technology Acceptance Model (TAM): An Operational Framework

Classical Technology Acceptance Model (TAM) paradigms evaluate adoption through two rigid metrics: Perceived Usefulness (PU) alongside Perceived Ease of Use (PEOU). However, this baseline proves inadequate within resource-constrained environments. Post-conflict, resource-constrained environments challenge the validity of such theoretical assumptions. Libyan higher education currently sustains a substantive 'Technological Deficit' (Faiz & Alsheky, 2026). Evaluating this fractured ecosystem demands a radically moderated TAM. We

must explicitly operationalise raw physical constraints. Infrastructural volatility, institutional policy stagnation, and chronic faculty undertraining operate as aggressive moderating variables that systematically rupture traditional TAM constructs.

Within this context, traditional theoretical utility is severely compromised; the Perceived Usefulness of cloud-dependent generative models is effectively nullified by the persistent unreliability of municipal power infrastructures, a harsh physical reality that renders the immense computational supremacy of foreign servers entirely meaningless for local student populations. Perceived Ease of Use absorbs identical distortions. Basic mechanical translation artificially inflates accessibility scores. While users execute these superficial operations effortlessly, systemic pedagogical deficits impede more advanced analytical deployment. Embedded physical and regulatory limitations create a stark dichotomy, determining whether computational tools drive legitimate academic progression or merely serve as ad-hoc administrative solutions applied across a decaying institutional framework.

3. Methodology: A Critical Analytical Review (CAR)

This study employs a Critical Analytical Review (CAR) methodology to examine the contemporary academic corpus concerning Libyan higher education (Faiz & Alsheky, 2026). Unlike traditional literature reviews that primarily synthesise existing narratives, the CAR methodology critically evaluates underlying structural contradictions and assesses the evidentiary integrity of the primary data. It allows us to engineer sovereign conceptual models specifically calibrated for volatile post-conflict topographies.

Governed by strict temporal parameters, our secondary data corpus restricts inclusion exclusively to peer-reviewed institutional diagnostics, macro-level quantitative surveys, and granular qualitative pedagogical observations published between 2023 and 2026, making triangulation imperative. Synthesising this dispersed geographical and disciplinary intelligence generates an exceptionally resilient, empirically grounded narrative.

This review synthesises data from several distinct, highly targeted datasets:

- Institutional Hardware Diagnostics: A sweeping quantitative diagnostic captures 350 faculty members at the University of Zawia, rigorously mapping usage typologies, hardware dependencies, and severe physical blockades (Kasheem et al., 2025; Alsayd et al., 2025).
- Socio-Linguistic Efficacy: Qualitative scrutiny of 55 English Language Teaching (ELT) academics operating across six separate institutions directly assesses the cultural validity and operational limitations of neural machine translation architectures (Taher, 2025).
- Impact Metrics: Empirical data gathered from the University of Benghazi alongside Sabratha University explicitly weighs raw academic progression against escalating technical paralysis.
- Disciplinary Algorithmic Bias: A targeted probe polling 300 engineering specialists from Nalut and Elmergib universities isolates severe discipline-specific moral hazards and escalating automation bias (Lashhab & Shniba, 2026).
- Macro-Systemic Tensions: An expansive digital census of 1,000 national educational professionals balances the hypothetical yield of hyper-personalised learning algorithms against substantial infrastructural acquisition costs (Shrif & Jamoum, 2025).
- Regional Ethical Demographics: Comparative quantitative benchmarking incorporates 168 academic voices from Yarmouk University, isolating strict demographic fault lines regarding computational ethics (Ashour & Banihani, 2025).
- Strategic Integration Protocols: A rigorous SWOT matrix engineers systemic deployment protocols tailored specifically for the Faculty of Computing and Information Technology at the University of Ajdabiya (Faiz & Alsheky, 2026).

Multi-stage thematic coding was utilised to categorise these institutional observations. We distil fragmented empirical data into a singular, highly concentrated map charting systemic ethical vulnerabilities across the national academic apparatus. The analysis reveals a persistent tension between pedagogical requirements and severe infrastructural limitations. This structural intersection exposes a stark dichotomy. The theoretical utopianism surrounding educational algorithms collapses entirely when forced to operate within the severe material constraints characterising chronically under-resourced physical environments.

4. Results & Discussion

4.1 The Paradox of Enthusiastic Fragility: Infrastructural and Economic Realities

Infrastructural constraints significantly shape the trajectory of machine learning integration across the Libyan academic apparatus. This convergence of physical limitations generates an acute operational vulnerability. Scholarship isolates this exact paradox as 'Enthusiastic Fragility' (Faiz & Alsheky, 2026). Institutional appetite for computational advancement permeates every academic tier, driving pedagogical ambition forward even as the supporting physical infrastructure falters structurally.

Hardware utilisation metrics expose a stark pragmatic adaptation. Faculty cohorts actively circumvent chronic environmental instability through highly specific device procurement. Raw data extracted from the University of Zawia indicates a pronounced shift away from traditional desktop configurations. Mobile computing architectures now predominate entirely (Alsayd et al., 2025). This hardware distortion is explicitly quantified in Table 1, which details the major reliance on mobile devices as an adaptation mechanism (Kasheem et al., 2025).

Table 1: Device Dependency due to Infrastructural Constraints (University of Zawia)

Hardware Modality	Usage Percentage (%)	Structural Implication
Mobile Laptops	93.7%	Primary adaptation mechanism against unpredictable municipal grid instability.
Tablet Devices	80.6%	Secondary supplementary device utilised for agile reading and grading.
Smartphones	40.6%	High reliance for on-the-go quick translation and algorithmic querying.
Stationary Desktops	13.1%	Near-abandonment due to total dependency on continuous municipal power.

(Data adapted from Kasheem et al., 2025).

Reflecting no organic user preference, this distorted hardware topography is enforced by severe municipal power failures and erratic campus infrastructure, compelling academics to deploy battery-reliant hardware to sustain baseline continuity. Raw qualitative metrics validate this structural collapse. Data indicates that 68.6% of surveyed faculty classify physical infrastructure as a critical operational barrier, while specific academic cohorts stationed at the University of Benghazi explicitly isolate chronic internet volatility as the primary structural barrier impeding artificial intelligence deployment (Kasheem et al., 2025).

Rudimentary offline operations occasionally survive these blackouts. Because advanced generative architectures demand uninterrupted, high-bandwidth cloud tethering to function, the national academic apparatus remains locked into shallow, superficial engagements with machine learning systems, entirely stripped of their deeper analytical capacities.

Financial constraints further exacerbate these infrastructural limitations, particularly given the prohibitive subscription costs associated with robust AI platforms. 84% of surveyed faculty identify these subscription costs as a primary operational barrier (Kasheem et al., 2025). State-funded universities lack the liquidity to secure comprehensive institutional licensing. The financial load transfers immediately onto the precarious budgets of individual educators and their students. This rapid offloading systematically dismantles the theoretical democratisation of computational intelligence. A sharply stratified academic hierarchy emerges. Affluent demographics purchase access to robust, unpolluted algorithms. Marginalised scholars are actively forced toward restricted, heavily biased free-tier applications, a structural reality that aggressively deepens existing sociotechnical divides across the republic (Shrif & Jamoum, 2025).

4.2 Institutional Governance and the Policy Vacuum

The empirical data reveals a significant absence of institutional governance; consequently, the higher education sector is navigating this computational shift without foundational regulatory or ethical frameworks. Metrics from the University of Zawia explicitly quantify this administrative abandonment, revealing that an overwhelming 99.4% of academic staff operate entirely ignorant of any formalised ethical protocols, regulatory frameworks, or operational directives governing algorithmic deployment (Kasheem et al., 2025; Alsayd et al., 2025). Administrative paralysis intersects directly with chronic pedagogical underdevelopment. Systemic training deficits systematically strip educators of analytical agency. Consequently, faculty agency in algorithmic selection and deployment is substantially diminished. They consume opaque, proprietary architectures unquestioningly rather than commanding these systems as informed, sovereign operators. As illustrated in Table 2, this systemic vulnerability is severely compounded by widespread deficits in formal institutional training.

Table 2: The Crisis in Professional Capacity and AI Readiness

Metric of Faculty Readiness & Training	Percentage Reported (%)	Epistemological Consequence
Lack Knowledge of Institutional AI Policy	99.4%	Widespread ad-hoc usage; extreme exposure to data privacy breaches.
Received Zero Formal AI Training (Complete Deficit)	46.0%	Functional illiteracy regarding underlying algorithmic mechanics.
Attended Only a Single Isolated Workshop	49.7%	Superficial engagement; systemic inability to audit AI outputs critically.

(Data adapted from Kasheem et al., 2025)

Sophisticated computational applications—such as high-dimensional statistical modelling, complex data visualisation, or advanced pedagogical restructuring—remain virtually non-existent. Academic cohorts default entirely to rudimentary mechanics. Operational bandwidth concentrates heavily on low-tier linguistic modification. Syntactic restructuring and grammar automation capture approximately 86.9% of user activity, while basic machine translation absorbs another 71.1% (Kasheem et al., 2025).

This operational stagnation reflects a significant administrative failure. Since no formal directives mandate acceptable deployment limits and no institutional protocols cultivate rigorous digital fluency, users navigate an absolute normative void. Individual actors execute highly fragmented, unsupervised operational choices. These unregulated, ad-hoc workflows systematically expose sensitive institutional intellectual property and leave protected personal data highly vulnerable to external extraction.

4.3 Algorithmic Bias and Digital Linguistic Imperialism

Unregulated computational deployment precipitates significant ethical decay. Algorithmic bias and phenomena described as 'algorithmic cultural flattening' actively erode local epistemic structures (Taher, 2025). Foundational large language models disproportionately sample Anglo-American linguistic corpora. They fail entirely at parsing the dense pragmatics of contextual Arabic dialects. This architectural prejudice inflicts severe pedagogical damage within English Language Teaching (ELT) environments.

Empirical scrutiny exposes a massive dislocation. Examining translation assignments across six Libyan universities, Taher (2025) quantifies a stark disconnect between mechanical syntax and pragmatic reality. Lexical accuracy appears remarkably high. Machine-assisted outputs consistently secure a 94% grammatical success rate, yet a marginal 12% of these submissions retain valid cultural interpretation. Consequently, these algorithms systematically homogenise the text, frequently omitting regional idioms, contextual humour, and nuanced sociopragmatic politeness markers.

Reliance on these tools often yields semantically inaccurate results, as algorithmic transliterations frequently fail to capture the socioreligious nuances essential to Libyan national identity (Taher, 2025). Core theological concepts suffer aggressive secularisation. Algorithms routinely process vernacular laden with heavy religious significance and generate sterile, culturally vacant equivalents, removing the cultural and theological context of the original text. Educators explicitly classify this mechanism as a potent vector for digital linguistic imperialism (Guido, 2025). Passive consumption drives cognitive assimilation causing students to continuously internalise a Western-centric sociotechnical paradigm, structurally dismantling their indigenous cultural consciousness from within.

4.4 Academic Integrity Erosion, Cognitive Deskilling, and Automation Bias

Generative architectures actively dismantle legacy assessment paradigms. Educators uniformly identify a pervasive 'copy-paste culture' proliferating across academic departments. This trend is statistically significant. Metrics reveal that 98.9% of faculty articulate severe alarm regarding the rapid systemic collapse of intellectual integrity and original scholarship (Kasheem et al., 2025). Observational empiricism validates these anxieties. Current metrics establish that 78% of the student body deploys machine intelligence as an immediate primary reflex. They bypass rigorous cognitive labour entirely. Complex analytical mandates devolve into sterile, algorithmic word-replacement protocols (Taher, 2025).

Persistent dependence on automated systems may impair essential cognitive faculties, as learners increasingly bypass critical analytical processes in favour of machine-generated outputs. Confronted with instantaneous, highly confident machine outputs, learners routinely abandon primary source engagement and cease asking interrogative questions, raising concerns that algorithmic systems cultivate a facade of infallible epistemic authority, which learners frequently internalize; this leads to the uncritical acceptance of automated fabrications and data hallucinations as empirical truths (Tojimuxammadov, 2025).

As independent ideation diminishes, academic discourse undergoes profound homogenisation, yielding student submissions that lack the idiosyncratic rhetorical friction characteristic of authentic scholarship.

Disciplinary boundaries generate sharply divergent ethical anxieties. Epistemological priorities fracture strictly along departmental lines. Humanities and social science scholars focus intensely on the erosion of authorial voice, rampant intellectual theft, and covert cultural erasure. Applied science and engineering faculties isolate entirely different existential threats. They evaluate algorithmic integration strictly through the lens of catastrophic structural miscalculation and imminent physical risks to public safety.

Empirical scrutiny of 300 engineering practitioners reveals stark professional anxieties. Veterans establish the epistemic baseline. Respondents possessing over a decade of field experience register acute distress regarding 'automation bias', returning a mean concern metric of 3.85 out of 5 (Lashhab & Shniba, 2026). Unintelligible algorithmic black boxes threaten safety-critical disciplines. Delegating structural load calculations or dynamic material stress tolerances directly to unmonitored machine intelligence poses substantial operational risks. Catastrophic physical collapse becomes statistically a tangible risk. Experienced practitioners argue that computational overreliance actively erodes foundational human engineering judgement. Professional experience serves as a critical heuristic. Years of accumulated, lived physical interaction forge an irreplicable professional safeguard against systemic structural failure.

Regional demography complicates this risk architecture entirely. Neighbouring geopolitical baselines provide stark analytical contrasts. Academic appraisals conducted at Jordan's Yarmouk University demonstrate absolute gender parity regarding ethical technological apprehension (Ashour & Banihani, 2025). The Libyan context significantly disrupts this demographic stability. Post-conflict data exposes profound demographic stratification, with female engineers demonstrating statistically acute elevations in professional and ethical alarm ($p = 0.036$) relative to male cohorts (Lashhab & Shniba, 2026). This specific divergence demands rigorous sociological dissection. Institutional collapse and infrastructural fragility disproportionately burden female populations operating within volatile reconstructive environments. Consequently, this demographic internalises severe risk aversion. They actively resist integrating opaque computational frameworks into physically vulnerable public sectors. Technical anxieties mask deeper sociological imperatives. Female practitioners adopt a fiercely protective posture over severely compromised public infrastructure, acutely aware that algorithmic misjudgements immediately trigger devastating societal consequences. Isolated examinations of politically stable neighbours entirely obscure this intricate intersectional dynamic.

4.5 Grassroots Pedagogical Resistance: "Teaching Against the Machine"

Infrastructural deficits and regulatory voids define the current academic landscape. Yet, beneath these systemic failures, innovative pedagogical adaptations are emerging. Digital policing remains an impossibility in this environment. Educators are consequently moving beyond restrictive, prohibitionist policies. They instead champion a strategy defined as 'teaching against the machine' (Taher, 2025).

Moving beyond ineffective avoidance strategies, educators are increasingly embedding generative systems within task-based curricula to actively mediate their impact. Learners must generate algorithmic translations for highly complex, culturally dense source texts. Following this, the pedagogical mandate shifts. Students meticulously contrast machine outputs with authoritative human translations. This analytical confrontation forces the explicit identification of pragmatic failures, linguistic erasures, and systemic bias.

Dissecting these mechanical failures initiates deep metacognitive engagement. A survey of 55 ELT practitioners validates the efficacy of this reflective methodology; those employing mediated, critical integration observe tangible gains in Intercultural Communicative Competence (ICC) (Taher, 2025). Contrast this with the outcomes of uncritical, unmediated usage. Unmediated usage is strongly correlated with inadequate cultural interpretation. This pedagogical inversion effectively demystifies the technology; by explicitly exposing algorithmic limitations, the systems are repurposed to enhance students' critical literacy and analytical independence.

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5. Conclusion & Strategic Integration Framework

Libya’s higher education ecosystem is experiencing a major paradigm shift. The assimilation of Artificial Intelligence into this fragile, recovering environment disrupts established pedagogical and ethical foundations. Across every surveyed demographic, excitement dominates (Shrif & Jamoum, 2025). Stakeholders champion AI’s promise for personalised curricula and expanded research output. Technological appetite has rapidly outstripped institutional maturity.

A perilous policy vacuum defines current operations. Existing digital infrastructures are severely strained by this rapid adoption. Ad-hoc adoption of generative systems invites systemic decay. Consequently, foundational standards of academic integrity are significantly compromised. When institutions deploy powerful, unmonitored algorithms without adequate internal oversight, they effectively dismantle the foundations of intellectual honesty, leaving sensitive data exposed to extraction and students susceptible to the flattening effects of opaque, Western-centric biases.

University leadership can no longer remain passive. Simply consuming global digital commodities offers no salvation. Data synthesis and strategic SWOT evaluations provide the necessary corrective. A multi-stage

integration roadmap replaces chaotic, reactive digitisation with a structured, ethically rigorous ecosystem (Faiz & Alsheky, 2026; see Table 3).

Table 3: The Multi-Stage Strategic Integration Framework for Libyan Higher Education

Integration Phase	Strategic Objectives & Mandated Actions	Expected Institutional Outcome
Phase One: Foundation, Capacity Building, and Policy Formulation	• Pursue Public-Private Partnerships (PPPs) to expand broadband and establish local data centres. • Draft comprehensive National AI Ethics Charters aligned with international standards and the moral paradigm of virtuous ethical conduct. • Implement continuous, mandatory professional development for faculty, focusing on critical digital pedagogy.	A stabilised infrastructural baseline coupled with an enforceable regulatory environment that protects student data and academic integrity.
Phase Two: Controlled Pilot Projects and Empirical Evaluation	• Launch targeted pilot projects in highly receptive faculties utilising controlled "sandbox" environments. • Establish Institutional Ethics Boards (IEBs) to monitor pilots using standardised metrics, tracking quantitative performance alongside qualitative impacts on student cognitive load.	Evidence-based assessment of AI efficacy tailored specifically to the Libyan academic context, identifying unforeseen risks before mass deployment.
Phase Three: Systematic Scaling and Localised R&D	• Invest heavily in localised Research and Development to create culturally responsive, open-source AI tools trained on bilingual Arabic-English corpora. • Integrate "AI Literacy" and bias awareness into the core curriculum across all disciplines.	The cultivation of a sovereign, technologically resilient academic ecosystem where students command AI as critical operators rather than passive subjects.

(Framework synthesised from Faiz & Alsheky, 2026; Ashour & Banihani, 2025).

Operationalising this integration framework demands a fundamental structural change. Libyan universities must fundamentally reconceptualise digital transformation. Intellectual sovereignty within this volatile post-conflict ecology never emerges from reactive technological rejection. It demands aggressive computational literacy. Academic survival dictates that machine intelligence be strictly governed by localised ethical frameworks to indigenous oversight.

Without robust, localised infrastructural support, the uncritical consumption of these technologies risks exacerbating structural dependencies. Policymakers face a stark mandate. They must force algorithmic transparency, build localised data repositories, and root digital pedagogy deeply within the region's existing moral architecture to actively neutralise the creeping threat of epistemic injustice. Future scholarship must pivot beyond descriptive technology acceptance models, requiring rigorous longitudinal empiricism to dissect exactly how meticulously controlled algorithmic exposure alters both long-term cognitive architecture and cultural endurance. Ultimately, technological integration must remain subordinate to pedagogical objectives, ensuring that AI adoption fosters critical autonomy and cultural resilience among learners.

References

[1] Alsayd, A., Masoud, M., Abdullah, M., Alzletni, N., Maati, A., Barka, A., & Baroud, N. (2025). Postgraduate students' usage patterns, perceptions, and attitudes toward artificial intelligence applications in learning: A case study of the University of Zawia, Libya. Journal of Education and Teacher Training Innovation, 3(1), 1-24.

[2] Al-Zahrani, A. M., & Alasmari, T. M. (2025). A comprehensive analysis of AI adoption, implementation strategies, and challenges in higher education across the Middle East and North Africa (MENA) region. Education and Information Technologies, 30(8), 11339-11389.

[3] Ashour, S. M., & Banihani, M. S. (2025). Ethical concerns arising from the use of generative artificial intelligence technologies and responsible use in higher education. Pakistan Journal of Life and Social Sciences, 23(1), 8628-8638.

[4] Bates, T., Cobo, C., Mariño, O., & Wheeler, S. (2020). Can artificial intelligence transform higher education?. International Journal of Educational Technology in Higher Education, 17(1), 42.

[5] Dignum, V. (2019). Responsible artificial intelligence: How to develop and use AI in a responsible way (Vol. 2156). Cham: Springer.

[6] Elmahdi, O. E. H., Balla, A. A. S., Abdelrady, A. H., Osman, E., & Ahmed, A. O. A. (2025). AI-driven vocabulary acquisition in EFL higher education: Interdisciplinary insights into technological innovation, ethical challenges, and equitable access. Forum for Linguistic Studies, 7(4), 112-128

[7] Faiz, B. H. N., & Alsheky, A. A. (2026). From Challenge to Transformation: AI Integration in Libyan Higher Education-An Analytical Review of Challenges and Proposed Integration Strategies. Journal of Insights in Basic and Applied Sciences, 2(1), 133-142.

[8] Farooqi, M. T. K., Amanat, I., & Awan, S. M. (2024). Ethical considerations and challenges in the integration of artificial intelligence in education: A systematic review. Journal of Excellence in Management Sciences, 3(4), 35-50.

[9] Guido, M. G. (2025). Artificial intelligence and machine translations as new forms of linguistic imperialism: Is there any future for variations of English as a Lingua Franca in intercultural communication?. Lingue e Linguaggi, 69, 327-343.

[10] Kasheem, M., Yahya, N., Shalghoum, N., Masuwd, M., Alriteemi, A., Abdullah, M., Alsaeh, F., & Alrumayh, S. (2025). Artificial Intelligence in Academic Research: Adoption, Opportunities, and Barriers among Faculty in Libya Higher Education. Multidisciplinary Journal of Thought and Research, 1(3), 109-127.

[11] Khan, W. N. (2024). Ethical challenges of AI in education: Balancing innovation with data privacy. AI EDIFY Journal, 1(1), 1-13.

[12] Khatri, B. B., & Karki, P. D. (2023). Artificial intelligence (AI) in higher education: Growing academic integrity and ethical concerns. Nepalese Journal of Development and Rural Studies. , 20(1), 1-7.

[13] Lashhab, E., & Shniba, A. (2026). Challenges and Opportunities of Artificial Intelligence Adoption in Engineering Education and Practice in Libya. Cigarskruie: Journal of Educational and Islamic Research, 3(2), 302-318.

[14] O'Neil, C. (2016). Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy. Crown.

[15] Sclater, N. (2017). Learning analytics explained. Routledge.

[16] Selwyn, N. (2022). The future of AI and education: Some cautionary notes. European Journal of Education, 57(4), 620-631.

[17] Shrif, S., & Jamoum, M. (2025). The future of education in Libya: Weighing the pros and cons of AI integration. AlQalam Journal of Medical and Applied Sciences, 8(2), 1092-1099.

[18] Taher, R. S. H. (2025). The effectiveness of AI-driven translation technologies in mediating cultural understanding: A case study of English language teaching practices in Libyan higher education. Libyan Journal of Educational Research and E-Learning (LJERE), 1(2), 01-16.

[19] Tojimuxammadov, J. (2025). Ethical Challenges of Artificial Intelligence in Education. Scientia. Technology, Science and Society, 2(11), 90-96.

[20] UNESCO. (2022). Recommendation on the ethics of artificial intelligence. United Nations Educational, Scientific and Cultural Organization.

[21] Zuboff, S. (2024). The age of surveillance capitalism: The fight for a human future at the new frontier of power. Journal of Information Ethics, 33(1), 84-85.