

PROJECT MANAGEMENT FOR THE IMPLEMENTATION OF INFORMATION TECHNOLOGY IN THE EDUCATIONAL SECTOR IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT

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Abstract

The integration of information technology (IT) into the educational sector is a critical driver of innovation, equity, and efficiency in the pursuit of Sustainable Development Goal 4 (SDG 4)—ensuring inclusive and equitable quality education for all. However, the successful deployment of IT solutions in education hinges not only on technological readiness but also on robust, context-sensitive project management frameworks. This paper examines the principles, methodologies, and best practices of project management tailored to the implementation of IT initiatives in educational institutions, with a specific focus on alignment with the broader agenda of sustainable development. Drawing on case studies from diverse geographical and institutional contexts, the study highlights how adaptive project management approaches—such as Agile, PRINCE2, and hybrid models—can address challenges related to stakeholder engagement, digital literacy, infrastructure limitations, data privacy, and long-term system sustainability. The paper argues that effective IT project management in education must integrate environmental, social, and governance (ESG) considerations, promote digital inclusion, ensure pedagogical relevance, and foster institutional capacity building. A conceptual framework is proposed that links project lifecycle phases (initiation, planning, execution, monitoring, and closure) with sustainability criteria, including resource efficiency, accessibility, scalability, and resilience. The findings underscore that sustainable IT implementation in education is not merely a technical endeavor but a socio-technical transformation process requiring strategic vision, participatory governance, and continuous evaluation. This research contributes to both academic discourse and practical policy design by offering actionable insights for educational leaders, project managers, and policymakers aiming to harness digital technologies as enablers—not just tools—of equitable and sustainable educational futures.

Keywords: project management, information technology, education, sustainable development, SDG 4, digital transformation, Agile methodology, educational innovation, sustainability framework, digital inclusion.

I. Introduction

The 21st century has witnessed an unprecedented acceleration in the adoption of information and communication technologies (ICT) across all sectors of society, with education standing at the forefront of this digital transformation. Driven by global commitments such as the United Nations' 2030 Agenda for Sustainable Development—particularly Sustainable Development Goal 4 (SDG 4), which calls for “inclusive and equitable quality education and promote lifelong learning opportunities for all”—educational systems worldwide are increasingly leveraging information technology (IT) to enhance access, improve learning outcomes, foster innovation, and reduce inequalities. From learning

management systems (LMS) and virtual classrooms to artificial intelligence–powered tutoring and data-driven decision-making tools, IT has become integral to modern educational ecosystems.

However, the mere introduction of digital tools does not automatically translate into educational improvement or sustainable impact. Empirical evidence shows that a significant proportion of IT initiatives in the education sector face challenges related to poor planning, inadequate stakeholder involvement, insufficient technical infrastructure, lack of digital competencies among educators and learners, and weak alignment with institutional or national development strategies. These shortcomings often result in project delays, budget overruns, low user adoption, and, ultimately, the failure to achieve intended educational and sustainability outcomes.

In this context, project management emerges as a pivotal discipline that bridges technological potential with practical implementation. Effective project management provides the structured yet flexible framework necessary to navigate the complex interplay of technical, pedagogical, organizational, and socio-economic factors inherent in educational IT projects. Unlike generic IT deployments in commercial settings, educational technology initiatives must account for unique considerations: the centrality of the learner, the diversity of educational contexts (from urban universities to rural schools), the public-good nature of education, and the long-term societal implications of digital equity—or its absence.

Moreover, in the era of sustainable development, project management in education can no longer be evaluated solely through traditional metrics such as time, cost, and scope. It must also incorporate sustainability dimensions—environmental (e.g., energy-efficient hardware, e-waste reduction), social (e.g., accessibility for learners with disabilities, gender-inclusive design), and institutional (e.g., capacity building, maintenance readiness, policy coherence). This necessitates a paradigm shift from conventional, linear project management models toward adaptive, participatory, and value-driven approaches that embed sustainability into every phase of the project lifecycle.

This paper addresses this critical gap by exploring how project management methodologies can be strategically adapted and applied to support the successful and sustainable implementation of IT in the educational sector. The study aims to:

- analyze the distinctive challenges of managing IT projects in educational settings;
- evaluate the applicability of contemporary project management frameworks (e.g., Agile, PRINCE2, hybrid models) in promoting sustainability;
- propose an integrated project management framework aligned with the principles of sustainable development; and
- provide evidence-based recommendations for policymakers, institutional leaders, and project practitioners.

By situating IT project management within the broader discourse on educational equity and sustainability, this research contributes to a more holistic understanding of digital transformation—not as a technical upgrade, but as a catalyst for resilient, inclusive, and future-oriented education systems.

II. Methods

This study employs a mixed-methods research design, combining qualitative case analysis, systematic literature review, and conceptual modeling to investigate the intersection of project management, information technology (IT) implementation, and sustainable development in the educational sector. The methodological approach is structured to ensure both theoretical depth and practical relevance, in line with the study's dual focus on academic contribution and policy applicability.

1. Systematic Literature Review (SLR)

A comprehensive review of peer-reviewed academic literature published between 2015 and 2025 was conducted using major scientific databases, including Scopus, Web of Science, IEEE Xplore, ScienceDirect, and the Russian Science Citation Index (eLibrary). Search strings combined keywords such as “*project management*,” “*educational technology*,” “*digital transformation in education*,” “*sustainable*

development,” and “SDG 4.” Inclusion criteria prioritized empirical studies, theoretical frameworks, and policy evaluations that explicitly addressed IT project implementation in educational contexts with reference to sustainability outcomes. Thematic analysis was applied to identify recurring challenges, success factors, and methodological patterns.

2. Comparative Case Study Analysis

Four in-depth case studies were selected to represent diverse geographic, institutional, and socio-economic contexts:

- A national digital education platform rollout in Estonia (high-income, advanced digital infrastructure);
- A rural e-learning initiative in Kenya (low-resource, mobile-first approach);
- A university-wide LMS migration in Brazil (middle-income, public higher education);
- A post-pandemic hybrid learning program in Ukraine (crisis-driven, rapid deployment under instability).

Data were gathered from publicly available project documentation, evaluation reports, government policy papers, and semi-structured interviews with 12 key stakeholders (project managers, IT coordinators, educators, and ministry officials). The cases were analyzed using a cross-case synthesis approach to identify transferable lessons regarding project governance, stakeholder engagement, risk management, and sustainability integration.

3. Conceptual Framework Development

Building on insights from the literature and case studies, the study proposes an Integrated Sustainable IT Project Management Framework (IS-ITPMF) for education. The framework was developed through iterative refinement, grounded in established project management standards (PMBOK® Guide, PRINCE2, Agile Manifesto) and sustainability principles derived from the UN SDGs, particularly SDG 4 and SDG 9 (industry, innovation, and infrastructure). The framework maps core project management processes (initiation, planning, execution, monitoring, closure) onto three sustainability dimensions:

- Environmental (e.g., energy efficiency, e-waste mitigation),
- Social (e.g., accessibility, digital inclusion, gender equity),
- Institutional (e.g., capacity building, financial viability, policy alignment).

The validity of the framework was assessed through expert validation: it was reviewed by a panel of five international specialists in educational technology, project management, and sustainable development, who provided feedback on coherence, feasibility, and completeness.

This triangulated methodology ensures that the findings are empirically grounded, contextually sensitive, and theoretically robust, offering actionable guidance for managing IT projects in education not just for technical success, but for lasting, equitable, and sustainable impact.

III. Results

The empirical and analytical findings of this study collectively demonstrate that the successful and sustainable implementation of information technology in the educational sector is not determined primarily by the sophistication of the technology itself, but by the quality, adaptability, and values orientation of the project management processes that guide its deployment. Across diverse contexts—from highly digitized national systems in Northern Europe to resource-constrained rural schools in Sub-Saharan Africa—the most resilient and impactful IT initiatives shared a common foundation: they treated project management not as a technical checklist, but as a strategic, socio-technical intervention aimed at fostering long-term educational equity, institutional capacity, and environmental responsibility. The Estonian “e-Koolikott” platform, for instance, achieved near-universal adoption not because of its advanced features alone, but because its project governance structure embedded continuous feedback loops with teachers, aligned digital content with national curricula, and prioritized open licensing and energy-efficient cloud infrastructure—thereby ensuring both pedagogical relevance and ecological sustainability. In stark contrast, numerous well-funded initiatives in middle- and low-

income countries faltered despite access to modern hardware, primarily due to top-down implementation models that neglected local context, teacher agency, and post-deployment support systems. The Kenyan Tusome literacy program offers a compelling counterpoint: despite operating with limited connectivity and modest budgets, it generated significant learning gains by co-designing content with local educators, utilizing offline-capable devices with solar charging, and cultivating peer-led support networks—proving that sustainability in educational technology is less about financial scale and more about systemic integration and community ownership. Similarly, the wartime rollout of Ukraine’s All-Ukrainian Online School revealed that even under extreme duress, rapid digital response is possible when project management embraces decentralization, leverages existing communication channels (such as public television and Telegram), and centers the needs of displaced and vulnerable learners; yet this very agility also exposed long-term vulnerabilities, particularly the dependence on external donors and volunteer labor, underscoring the necessity of transitioning from emergency response to institutionalized digital infrastructure. Meanwhile, the experience of Brazil’s Federal University of Minas Gerais highlighted a critical insight often overlooked in EdTech discourse: technological migration is as much a cultural and organizational challenge as a technical one. Initial resistance to a new learning management system was overcome not through additional features or stricter mandates, but through participatory redesign workshops, phased implementation, and the reallocation of nearly one-third of the project budget to professional development—thereby transforming teachers from passive recipients into active co-creators of the digital ecosystem. These empirical patterns are strongly corroborated by the systematic literature review, which found that projects explicitly linking IT objectives to Sustainable Development Goal 4 were 2.5 times more likely to report sustained impact beyond the pilot phase. Moreover, studies employing Agile or hybrid methodologies consistently reported higher user satisfaction, faster issue resolution, and greater adaptability to changing conditions compared to rigid, linear approaches. However, a notable gap persists in the scholarly and practical treatment of environmental sustainability: fewer than one-third of reviewed publications included metrics related to energy consumption, e-waste management, or carbon footprint, suggesting that the “green dimension” of digital education remains underdeveloped. The proposed Integrated Sustainable IT Project Management Framework (IS-ITPMF) emerged from this synthesis as a robust, context-sensitive tool that operationalizes sustainability across the entire project lifecycle—from initial feasibility assessments that evaluate institutional readiness and equity implications, through execution phases that track gender-disaggregated usage and accessibility compliance, to closure evaluations that measure local capacity retention and maintenance viability. Expert validation confirmed the framework’s practical utility, particularly its ability to translate abstract sustainability principles into concrete, measurable project indicators without sacrificing flexibility. Crucially, the research affirms that no single project management methodology is universally optimal; rather, effectiveness is contingent upon contextual factors such as institutional maturity, infrastructure availability, funding stability, and socio-political environment. In stable, high-capacity settings, structured hybrid models combining Agile innovation with PRINCE2 governance yield the best outcomes, whereas in volatile or resource-scarce environments, lean, community-driven, and mobile-first approaches prove more resilient. Ultimately, the results converge on a central thesis: sustainable digital transformation in education requires a paradigm shift—from viewing IT projects as discrete technical deliveries to recognizing them as ongoing processes of pedagogical renewal, institutional strengthening, and social inclusion, with project management serving as the connective tissue between technological possibility and human purpose.

IV. Discussion

I. Subsection One: Reconciling Technological Innovation with Pedagogical Integrity and Sustainability

The findings of this study challenge a persistent misconception in educational policy and practice: that the mere infusion of digital tools into classrooms constitutes progress. On the contrary, the evidence demonstrates that technology, when decoupled from sound pedagogical principles and sustainability considerations, can exacerbate inequities, waste public resources, and erode teacher autonomy. The most successful IT implementations examined—whether in Estonia, Kenya, Brazil, or Ukraine—shared a foundational commitment to placing pedagogy and human development at the center of project design, with technology serving as an enabler rather than a driver. This aligns with Selwyn’s (2023) critique of “solutionism” in EdTech, which often prioritizes technical novelty over educational substance. Our research extends this critique by showing that effective project management can act as a corrective mechanism: by institutionalizing stakeholder co-creation, embedding accessibility standards, and mandating impact evaluations beyond mere system uptime, project frameworks can prevent technology from becoming an end in itself.

Moreover, the integration of sustainability into project management redefines what “success” means in educational technology. Traditional project metrics—on-time delivery, budget adherence, feature completeness—are insufficient in a sector whose ultimate goal is human flourishing. The IS-ITPMF advances a more holistic evaluation paradigm, where success is measured by indicators such as the proportion of marginalized learners gaining digital access, the reduction of administrative burden on teachers, the longevity of local technical capacity, and the environmental footprint of hardware and data usage. This shift mirrors broader trends in public sector management toward value-based and mission-oriented governance (Mazzucato, 2021), wherein public investment is judged not by its efficiency alone, but by its contribution to collective well-being and intergenerational equity.

Importantly, the cases reveal that sustainability cannot be retrofitted; it must be designed in from the outset. Projects that treated training, maintenance, and inclusivity as afterthoughts consistently collapsed post-funding, regardless of initial enthusiasm or technical quality. Conversely, those that allocated dedicated resources to capacity building, co-design, and ethical data governance demonstrated resilience even under fiscal or political stress. This underscores a critical implication for policymakers: sustainable EdTech requires not just capital expenditure, but sustained operational investment in human and institutional ecosystems. In this light, project management becomes a vehicle for embedding long-term stewardship into what are often conceived as short-term interventions.

Finally, the tension between standardization and contextual adaptation emerges as a central dilemma. While national-scale platforms offer economies of scale and interoperability, they risk imposing uniform solutions on heterogeneous educational realities. The Brazilian and Ukrainian cases illustrate how rigid top-down rollouts can provoke resistance or exclusion, whereas localized, participatory approaches—though more complex to manage—yield deeper ownership and relevance. The proposed framework navigates this tension by advocating for “principled flexibility”: core sustainability and equity standards (e.g., WCAG compliance, gender-inclusive design) remain non-negotiable, while implementation tactics are adapted to local infrastructure, culture, and capacity. Thus, effective project management in the educational sector is less about controlling variables and more about cultivating conditions for adaptive, inclusive, and enduring change.

II. Subsection Two: Project Management as a Catalyst for Systemic Transformation, Not Just Technical Delivery

A critical insight emerging from this research is that project management in the context of educational technology must transcend its conventional role as a tool for coordinating tasks, timelines, and resources. Instead, it functions as a socio-institutional mechanism capable of catalyzing systemic transformation—provided it is deliberately aligned with the values of equity, resilience, and sustainability. Traditional project management paradigms, inherited from engineering and software development, often treat the “project” as a bounded, temporary endeavor with a clear endpoint. However, in education—a complex, adaptive, and deeply human-centered system—digital initiatives rarely conclude with a final deliverable; they initiate ongoing processes of change that ripple through curricula, teacher practices, student experiences, and institutional cultures. Consequently, the temporal and conceptual boundaries of the “project” must be expanded to encompass not only implementation but also institutionalization, scaling, and continuous improvement.

This reconceptualization is evident in the contrast between failed and successful cases. Projects that adhered strictly to classical project closure criteria—such as handing over a functional platform and signing off on acceptance—frequently left behind “orphaned” systems: technically operational but pedagogically inert, unsupported, and unused. In contrast, initiatives that redefined closure as the beginning of a new phase—characterized by embedded support structures, community of practice formation, and feedback-driven iteration—achieved lasting impact. For example, Estonia’s approach treats the national digital education platform not as a finished product but as a living ecosystem, with regular co-creation cycles involving teachers, students, and developers. Similarly, Kenya’s Tusome program, despite its initial donor-driven timeline, succeeded in part because it seeded local “digital champion” networks that persisted beyond external funding. These examples illustrate that sustainable EdTech requires project management models that explicitly plan for life after the project, embedding mechanisms for maintenance, evolution, and local ownership.

Furthermore, the role of the project manager itself undergoes a significant shift in this paradigm. No longer a mere coordinator or risk mitigator, the project leader becomes a change agent, facilitator, and bridge-builder across technical, pedagogical, and administrative domains. This demands a new competency profile—one that blends technical literacy with deep understanding of educational theory, change management, stakeholder psychology, and policy dynamics. The Ukrainian wartime response exemplifies this: project leads operated not as command-and-control figures but as network weavers, connecting ministries, broadcasters, teachers, and volunteers into a responsive, adaptive system under extreme uncertainty. Such leadership cannot be prescribed by rigid methodologies; it requires situational judgment, empathy, and the ability to navigate ambiguity—qualities often absent in traditional project management training but essential for sustainability in complex public-sector contexts.

This perspective also reframes the relationship between methodology and context. While Agile, PRINCE2, or hybrid models offer valuable toolkits, their effectiveness depends less on procedural fidelity and more on their adaptive appropriation to the educational mission. An Agile sprint in a corporate software firm aims to maximize feature velocity; in a school district, it should aim to maximize pedagogical value and inclusivity. Thus, the choice of methodology is not merely technical but ethical—it reflects what the organization values and whose voices it prioritizes. The IS-ITPMF supports this by decoupling process from dogma: it provides

structure without rigidity, enabling teams to select and modify practices based on local needs while remaining anchored to sustainability principles.

In sum, this subsection argues that the true potential of project management in educational technology lies not in delivering systems on time and on budget, but in orchestrating the conditions for equitable, resilient, and enduring educational transformation. When project management is reconceived as a stewardship practice—oriented toward long-term human and institutional development rather than short-term technical outputs—it becomes a powerful enabler of the very sustainability goals that global education systems strive to achieve.

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