

Role of Islamic Microfinance in Promoting Science and Technology Education in Nigeria: A Comprehensive Review and Policy Analysis

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Abstract

Nigeria's science and technology (S&T) education sector faces chronic deficits in financing, infrastructure, and equitable access that constrain human capital development and national competitiveness. This systematic review investigated the role of Islamic microfinance in addressing these challenges, guided by Human Capital Theory as its analytical framework. Secondary data were collected from peer-reviewed journals, institutional reports, and policy documents published between 2020 and 2025, and analyzed through qualitative content analysis. Findings reveal that Islamic microfinance contributes to S&T educational development through four principal mechanisms: direct student financing via interest-free instruments (Qard al-Hasan); educational infrastructure investment through Waqf endowments; entrepreneurship and skills development support utilizing Mudarabah and Musharakah arrangements; and household poverty reduction that indirectly expands educational access. These instruments offer structurally sustainable, equity-oriented alternatives to conventional financing. However, significant constraints including weak regulatory frameworks, limited Waqf and Zakat mobilization, geographic service concentration, and low public awareness currently limit their impact. Deliberate policy integration, institutional strengthening, and government

Islamic finance collaboration are recommended to unlock Islamic microfinance's full potential for advancing S&T education in Nigeria.

Keywords:

Islamic microfinance; science and technology education; educational financing; Waqf; Zakat; human capital development

INTRODUCTION

Education constitutes a foundational mechanism for national development, poverty reduction, economic transformation, and the cultivation of technical competencies requisite for global competitiveness (UNESCO, 2023). Within this broader context, science and technology (S&T) education assumes particular strategic significance, as it cultivates critical thinking capacities, scientific literacy, innovative problem-solving skills, and technical expertise essential for contemporary industrial societies. Nations with robust S&T educational systems consistently generate competitive advantages in research and development, biotechnology, information and communications technology, renewable energy, and advanced manufacturing, while simultaneously building the human capital stocks that underpin long-term economic resilience (Okeke & Ibrahim, 2024; Adebayo & Yusuf, 2023).

In the Nigerian context, the National Policy on Education (Federal Republic of Nigeria, 2019) explicitly designates S&T education as a national priority, emphasizing the imperative to equip learners with practical competencies and analytical reasoning necessary for meaningful contribution to national development. Nigeria, as Africa's most populous nation with abundant mineral, human, and agricultural resources, holds an acute developmental imperative to build robust S&T educational capacity. However, despite this explicit policy recognition, Nigeria's S&T education sector confronts formidable structural and systemic obstacles that fundamentally constrain access, quality, and outcomes. These challenges encompass severe financial resource insufficiency characterized by inadequate budgetary allocations, pervasive infrastructural inadequacy including shortage of functional laboratory facilities and contemporary technological equipment, pronounced teacher supply-demand imbalances, economic barriers that limit student participation—particularly among those from low-income households—and pronounced urban-rural disparities in educational quality and access (Okeke & Ibrahim, 2024; Adebayo & Yusuf, 2023). The cumulative consequence of these structural deficiencies includes chronically low S&T enrolment rates, inadequate skill development, limited alignment between educational outputs and labor market demands, and the perpetuation of educational inequalities that reproduce broader patterns of social stratification.

Islamic microfinance has progressively emerged as an alternative and complementary financial system capable of mobilizing resources, addressing poverty, and supporting community development in resource-constrained contexts (Obaidullah & Khan, 2022). Conceptually, Islamic

microfinance refers to the systematic provision of financial services to economically disadvantaged individuals and small enterprises operating outside formal banking accessibility, delivered in strict compliance with Islamic jurisprudential (Shariah) principles. Its fundamental distinction from conventional microfinance lies in the explicit prohibition of interest-based transactions (*riba*), the emphasis on equitable wealth distribution, risk-sharing arrangements, ethical investment practices, and the prioritization of social welfare alongside financial sustainability (Ahmed, 2023). The primary instruments deployed within Islamic microfinance include: *Qard al-Hasan* (interest-free benevolent loans); *Zakat* (obligatory annual charitable contributions of approximately 2.5% of surplus wealth); *Waqf* (perpetual charitable endowments generating sustained revenue for designated purposes); *Mudarabah* (profit-sharing partnerships between capital providers and entrepreneurs); and *Musharakah* (joint venture financing with shared capital, expertise, and profit distribution) (Obaidullah & Khan, 2022; Rahman, 2024). These instruments are structurally designed to generate positive social impact, support vulnerable populations, and promote sustainable community development.

Empirical evidence from Muslim-majority and diverse developing nations demonstrates that Islamic microfinance institutions have contributed meaningfully to educational access and quality improvement through multiple channels. Hassan and Aliyu (2023) documented that Islamic social finance instruments—particularly *Zakat* and *Waqf*—have substantially improved educational access among economically disadvantaged populations in Northern Nigeria, facilitating participation in secondary and tertiary education and supporting educational infrastructure development. Rahman (2024) provided evidence that *Waqf*-based educational financing has sustained institutions across several Muslim-majority nations, funding scientific laboratories, technology innovation centers, and advanced educational infrastructure that would otherwise remain financially unattainable. The documented mechanisms of Islamic microfinance contributions to education include: direct student financing through interest-free educational loans; scholarship provision funded through *Zakat* and *Waqf* revenues; infrastructure development financing for laboratory construction and information and communications technology centers; entrepreneurship and business skills support for S&T graduates; and vocational training initiatives enhancing employment readiness (Ahmed, 2023; Hassan & Aliyu, 2023). In Nigeria specifically, Islamic microfinance institutions have demonstrated increasing effectiveness in poverty reduction, entrepreneurship development, and educational support provision within Muslim-majority communities and beyond (Hassan & Aliyu, 2023; Rahman, 2024).

This study is anchored upon Human Capital Theory, pioneered by Schultz (1961) and further developed by Becker (1964), which posits that investments in education and skills development substantially enhance individual productive capacities, generating sustained economic returns that exceed initial investment costs. More broadly, educational investments accumulate into national human capital stocks that determine a nation's productive capacity, innovation potential, and long-term economic competitiveness. Within this theoretical framework, Islamic microfinance operates as a critical financing mechanism that mobilizes resources for S&T educational investments otherwise inaccessible to economically disadvantaged populations. By enabling educational participation and skills acquisition, Islamic microfinance facilitates human capital formation, thereby generating positive economic returns at individual, household, community, and national levels. Simultaneously, the equity-oriented principles of Islamic

microfinance—prioritizing disadvantaged population support, poverty reduction, and social welfare—align directly with human capital theory's emphasis on education as an instrument of poverty mitigation and inequality reduction.

Despite the growing recognition of Islamic microfinance's development potential, scholarly attention to its specific, deliberate contributions to S&T education advancement remains remarkably limited. Existing literature predominantly addresses Islamic microfinance in the context of poverty alleviation and general financial inclusion, with insufficient attention to its role as a targeted educational financing mechanism for S&T disciplines. This knowledge gap is particularly consequential given Nigeria's substantial population of economically disadvantaged youth with untapped scientific and technological potential, its urgent developmental imperative to build S&T capacity, and the underutilized potential of Islamic financial instruments to mobilize dedicated educational financing.

Against this backdrop, this systematic review pursues four interrelated objectives: (1) to investigate the documented contributions of Islamic microfinance in promoting equitable and accessible S&T education in Nigeria; (2) to examine the specific Islamic financial instruments and mechanisms through which these contributions are realized; (3) to identify key implementation challenges and systemic constraints that limit effectiveness; and (4) to propose evidence-informed policy recommendations for the enhanced and deliberate integration of Islamic microfinance within Nigeria's educational development framework. The findings of this review are intended to inform policymakers, Islamic financial institutions, educational administrators, and development partners seeking to optimize Islamic microfinance as a sustainable and ethical complementary financing mechanism for S&T education in Nigeria.

METHODS

This study employed a descriptive systematic review design to examine and synthesize documented evidence concerning the role of Islamic microfinance in promoting science and technology (S&T) education in Nigeria. A systematic review approach was selected as it provides a rigorous, transparent, and replicable framework for comprehensively mapping existing knowledge, identifying thematic patterns, and drawing evidence-informed conclusions from dispersed literature—without the construction of experimental conditions or primary data collection (Creswell & Creswell, 2017; Snyder, 2019). This design is particularly appropriate given the objectives of the present study, which sought not to test causal hypotheses but to synthesize, evaluate, and critically interpret the accumulated body of scholarship concerning Islamic microfinance as an educational financing mechanism in resource-constrained developing-country contexts.

Data were drawn exclusively from secondary sources identified through a systematic search of multiple academic databases, including Google Scholar, JSTOR, and relevant institutional repositories. The search encompassed peer-reviewed journal articles, institutional reports from bodies such as the Central Bank of Nigeria, the National Universities Commission, and UNESCO West Africa offices, government policy documents including Nigeria's National Policy on Education (Federal Republic of Nigeria, 2019), scholarly books and book chapters, and conference proceedings from the fields of Islamic finance, educational development, and

development economics. To ensure currency and relevance, the primary literature search was bounded to publications from 2020 through 2025; however, foundational theoretical works—particularly those underpinning Human Capital Theory (Schultz, 1961; Becker, 1964) and seminal frameworks in Islamic microfinance (Obaidullah & Khan, 2022)—were included regardless of publication date given their indispensable conceptual contributions.

Collected sources were subjected to qualitative content analysis, a rigorous and well-established methodology that enables systematic identification, categorization, and interpretation of textual and documentary material while minimizing researcher subjectivity through structured analytical procedures (Elo & Kyngäs, 2008; Mayring, 2015). Analysis was conducted across six thematic domains: (1) documented mechanisms through which Islamic microfinance supports S&T educational access and quality; (2) specific Islamic financial instruments and their educational applications; (3) empirical evidence regarding educational outcomes attributable to Islamic microfinance interventions; (4) implementation challenges and systemic constraints; (5) policy and institutional enabling factors; and (6) opportunities for deepened integration of Islamic microfinance within Nigeria's educational development strategy. Findings across these domains were then synthesized into a coherent, evidence-based narrative that directly addresses the study's four stated objectives.

RESULT AND DISCUSSION

The systematic review of literature identified four principal mechanisms through which Islamic microfinance contributes to science and technology (S&T) education in Nigeria, alongside a set of structural sustainability attributes and critical implementation constraints. The following subsections present and discuss these findings in relation to the theoretical framework of Human Capital Theory and the broader educational financing challenges outlined in the Introduction.

Islamic Microfinance Support for Science and Technology Education

Direct Educational Financing

One of the most direct and immediately impactful mechanisms through which Islamic microfinance supports S&T education is the provision of interest-free educational financing. Qard al-Hasan loans enable students from economically disadvantaged households to meet tuition fees, accommodation costs, laboratory materials, and examination expenses that would otherwise constitute insurmountable financial barriers. Unlike conventional commercial loans, whose compounding interest structures impose long-term repayment burdens that disproportionately affect low-income borrowers, Qard al-Hasan requires only the return of principal, fundamentally reducing the total cost of educational investment (Hassan & Aliyu, 2023). This feature is especially significant in the Nigerian context, where approximately 63% of the population lives below the multidimensional poverty threshold (National Bureau of Statistics [NBS], 2022), rendering interest-bearing student financing inaccessible and unsustainable for the majority of potential S&T students.

Complementing direct loan provision, Islamic microfinance institutions systematically channel Zakat revenues and Waqf endowment income into scholarship programmes for academically capable students from low-income households. Zakat-funded scholarships operationalize the Quranic obligation to allocate charitable distributions to those experiencing poverty (*fuqarā'*),

while Waqf-based scholarships draw upon perpetual endowments whose principal remains inviolable, generating sustained revenue streams across generations (Rahman, 2024). The structural permanence of Waqf endowments addresses a critical weakness in conventional educational funding models—namely, their vulnerability to annual budgetary fluctuations—providing the stability and long-term predictability essential for effective educational planning. From the perspective of Human Capital Theory, these instruments collectively lower the financial barriers to educational investment for disadvantaged populations, facilitating human capital formation that would otherwise be foregone due to market failures in credit access (Schultz, 1961; Becker, 1964).

Educational Infrastructure Financing

Beyond individual student financing, Islamic microfinance—particularly through Waqf endowments and collective charitable investment vehicles—makes substantive contributions to institutional S&T educational infrastructure. The capital-intensive requirements of functional S&T education, including equipped science laboratories, information and communications technology (ICT) centers, technical workshops, vocational training facilities, and digital learning libraries, typically exceed the independent financial capacities of Nigerian educational institutions operating under severely constrained government allocations (Rahman, 2024). Nigeria's public expenditure on education has persistently fallen below the UNESCO-recommended threshold of 15–20% of national budget, averaging approximately 5–7% in recent years (UNESCO, 2023; Adebayo & Yusuf, 2023), creating a chronic infrastructure deficit that undermines educational quality at scale.

Islamic microfinance institutions have responded to this deficit by financing laboratory construction and equipment procurement, ICT center establishment, and innovation hub development that facilitates hands-on student engagement with practical technology application (Ahmed, 2023). The historical precedent for Waqf-based institutional infrastructure financing is well established; across Muslim-majority nations, Waqf endowments have historically sustained universities, libraries, and research institutions for centuries, demonstrating the model's long-term viability (Mohieldin et al., 2012). Translating this model into the contemporary Nigerian S&T education context represents a significant opportunity, particularly given the country's large Muslim population concentrated in the North—a region that simultaneously faces the most acute S&T educational infrastructure deficits (Okeke & Ibrahim, 2024). Infrastructure investments of this nature directly enhance educational quality, facilitate experiential and inquiry-based learning, and develop the practical competencies that align educational outputs with contemporary labor market and entrepreneurial demands.

Entrepreneurship and Skills Development Support

The reviewed literature reveals a growing recognition within Islamic microfinance institutions that the transition from S&T education to productive employment or self-sustaining enterprise is neither automatic nor guaranteed, particularly within Nigeria's constrained formal employment market. Youth unemployment in Nigeria reached approximately 53.4% in 2020 (NBS, 2021), with S&T graduates among those disproportionately affected by the mismatch between educational credentials and available formal employment opportunities. In response, Islamic microfinance institutions have progressively developed integrated post-graduation support

frameworks encompassing entrepreneurship training, business skills development, and startup capital provision through Musharakah and Mudarabah financing arrangements (Hassan & Aliyu, 2023).

These integrated support services—including business planning, financial management, technology incubation support, mentorship, and advisory services during critical enterprise formation phases—enable S&T graduates to establish technology-based ventures that generate employment, income, and community economic development while demonstrating practical applications of their scientific knowledge (Ahmed, 2023; Rahman, 2024). This mechanism aligns directly with human capital theory's proposition that the economic returns on educational investment are maximized when complementary support systems facilitate the productive deployment of acquired skills and knowledge (Becker, 1964). Furthermore, Musharakah and Mudarabah arrangements are structurally advantageous for early-stage technology enterprises precisely because their risk-sharing architecture distributes financial exposure between the financing institution and the entrepreneur—a feature particularly important where business failure risks are elevated, as is characteristic of technology startup environments in developing economies (Obaidullah & Khan, 2022).

Poverty Reduction and Educational Access Expansion

The literature consistently identifies an indirect but structurally important pathway through which Islamic microfinance expands S&T educational access: household-level poverty reduction and financial inclusion. By extending credit and savings facilities to economically disadvantaged households outside the reach of formal banking, Islamic microfinance improves household income stability, reduces income volatility, and expands disposable income available for educational investment (Hassan & Aliyu, 2023). This mechanism operates through the classical human capital theory logic that household income constraints constitute a primary determinant of educational investment decisions, particularly in low-income settings where the opportunity costs of children's school attendance are high (Schultz, 1961).

Empirical evidence from Northern Nigeria indicates that household-level access to Islamic microfinance services correlates positively with increased school enrolment rates, reduced dropout rates, and improved educational achievement, with particularly pronounced effects among female students in contexts where gender-based educational access constraints are culturally embedded (Hassan & Aliyu, 2023). This gender dimension is especially consequential for S&T education, where female participation rates remain significantly below those of male students—a disparity that Islamic microfinance's community-based outreach and gender-sensitive financing models are uniquely positioned to address (Ahmed, 2023). The geographic expansion of Islamic microfinance services into rural and remote communities further facilitates educational infrastructure establishment and educator recruitment in previously underserved areas, thereby reducing the urban-rural educational quality gap that represents one of Nigeria's most persistent equity challenges (Okeke & Ibrahim, 2024).

Islamic Financial Instruments and Sustainability

A critical dimension distinguishing Islamic microfinance from conventional educational financing mechanisms is the structural sustainability of its primary instruments. As identified in the systematic review, Waqf endowments generate revenue in perpetuity without depleting the

principal endowment, providing financing streams that are independent of government budgetary cycles, political volatility, and fluctuating philanthropic giving patterns. Zakat obligations, as mandatory annual contributions calculated at approximately 2.5% of qualifying surplus wealth, represent a relatively stable and predictable revenue source whose aggregate potential in a country of Nigeria's Muslim population size is substantial. Estimates suggest that Nigeria's annual Zakat potential may exceed several billion US dollars when calculated against the total wealth of Zakat-eligible Muslims, though institutional mechanisms for systematic collection and deployment remain underdeveloped (Hassan & Aliyu, 2023; Obaidullah & Khan, 2022).

The sustainability characteristics of Islamic financing instruments extend beyond their permanence and stability. Profit-sharing arrangements—Mudarabah and Musharakah—align institutional financial incentives with borrower success by distributing both profits and losses proportionally, thereby eliminating the extractive dynamic inherent in interest-based debt instruments where the lender profits regardless of borrower outcomes (Rahman, 2024). This equity orientation creates institutional accountability mechanisms that enhance responsiveness to beneficiary needs and preferences, strengthening program relevance and community ownership over time. Moreover, the community-centered social accountability embedded in Islamic finance's ethical architecture promotes transparency in resource deployment and builds the trust necessary for sustained beneficiary engagement—attributes increasingly recognized in development finance literature as essential determinants of long-term program effectiveness (Ahmed, 2023; Mohieldin et al., 2012). Collectively, these structural sustainability attributes position Islamic microfinance as a complementary financing mechanism capable of providing the predictable, long-term, equity-oriented resources that S&T educational development requires—attributes that neither annual government budget allocations nor one-time donor grants reliably supply.

Implementation Challenges and Constraints

Despite the substantial documented potential identified across the preceding subsections, the review reveals significant implementation challenges that currently limit the scale, reach, and effectiveness of Islamic microfinance contributions to S&T education in Nigeria. The most fundamental constraint is the deficiency in public awareness regarding Islamic microfinance services, available educational financing instruments, and eligibility requirements—particularly among target populations in non-Muslim-majority regions and among educationally disadvantaged communities with limited access to financial information. This awareness gap is compounded by inadequate regulatory frameworks governing Islamic microfinance operations, insufficient institutional coordination between microfinance organizations and educational institutions, and limited integration of Islamic microfinance within government educational development strategies (Hassan & Aliyu, 2023; Rahman, 2024). The Central Bank of Nigeria's microfinance regulatory framework, while progressively evolving, has yet to establish dedicated provisions for Shariah-compliant educational financing schemes, creating operational ambiguity that constrains institutional innovation.

Resource insufficiency presents an equally critical constraint. Current Islamic microfinance allocations to educational financing represent a negligible fraction of Nigeria's total educational

funding requirements—a gap that reflects both the relatively early stage of institutional development and the absence of systematic mechanisms for mobilizing the country's latent Zakat and Waqf potential at scale (Obaidullah & Khan, 2022). Geographic concentration of existing Islamic microfinance services in urban centers and Muslim-majority regions of the North further limits access for rural populations and those in geographically dispersed communities, reproducing rather than mitigating the spatial inequalities in educational access already documented in the Introduction. Coordination gaps between Islamic microfinance institutions, government educational agencies, private sector educational providers, and civil society organizations additionally prevent the development of comprehensive and integrated educational financing solutions (Ahmed, 2023).

At the institutional level, a human capital deficiency within Islamic microfinance organizations themselves—specifically the shortage of practitioners with specialized expertise in S&T education financing, educational technology integration, and outcome measurement—limits institutional capacity to design, implement, and evaluate effective S&T educational financing programmes. There are also sustainability concerns regarding the long-term financial viability of educational programmes that explicitly prioritize service to the most disadvantaged populations over revenue generation, creating a structural tension between social mission and institutional financial sustainability that Islamic microfinance institutions must navigate (Hassan & Aliyu, 2023). Finally, cultural and religious sensitivity concerns—including potential institutional resistance to Islamic financing approaches in Nigeria's religiously pluralistic context, and limited understanding of Islamic financial principles among mainstream education sector practitioners and policymakers—represent socio-cultural barriers that require deliberate awareness and capacity-building interventions to overcome. Taken together, these constraints suggest that realizing the full potential of Islamic microfinance for S&T education in Nigeria is contingent not merely on scaling existing programs, but on fundamental reforms to the regulatory, institutional, and policy environment within which Islamic microfinance operates.

CONCLUSION

This systematic review set out to examine the role and potential of Islamic microfinance in promoting science and technology (S&T) education in Nigeria across four interrelated objectives: documenting existing contributions, identifying the mechanisms through which those contributions are realized, mapping implementation constraints, and proposing policy recommendations for enhanced integration. The review synthesized evidence drawn from peer-reviewed literature, institutional reports, and policy documents published primarily between 2020 and 2025, analyzed through the conceptual lens of Human Capital Theory. The findings affirm that Islamic microfinance institutions contribute meaningfully and multidimensionally to S&T educational development in Nigeria through four principal mechanisms: direct student financing via interest-free instruments such as Qard al-Hasan; educational infrastructure investment facilitated by Waqf endowments; integrated entrepreneurship and skills development support delivered through Mudarabah and Musharakah arrangements; and broader household poverty reduction that indirectly expands S&T educational access, particularly for female students and rural communities.

Interpreted through the framework of Human Capital Theory, these findings carry important theoretical implications. Islamic microfinance functions not merely as a charitable or welfare

intervention, but as a structurally distinctive mechanism for financing human capital investment in contexts where conventional credit markets systematically exclude the poor. The equity orientation of Islamic financial instruments—their prohibition of interest, emphasis on risk-sharing, and community welfare prioritization—addresses market failures that prevent low-income households from making optimal educational investments, precisely the condition that Human Capital Theory identifies as the primary rationale for public and alternative-sector intervention in educational financing. In this respect, the present review contributes to the growing body of scholarship recognizing Islamic social finance as a development instrument of substantive theoretical and practical significance, extending its documented applications beyond poverty alleviation into the more specific domain of S&T education financing.

Notwithstanding these contributions, the review reveals a significant and consequential gap between Islamic microfinance's demonstrated potential and its current impact on Nigeria's S&T education landscape. This gap is attributable to a confluence of structural constraints: inadequate public awareness of available financing mechanisms; weak regulatory and institutional frameworks for Waqf and Zakat mobilization; chronic underfunding relative to total educational financing needs; geographic concentration of services in urban and Muslim-majority areas; limited inter-institutional coordination; and insufficient practitioner capacity in S&T-specific educational financing. The review also acknowledges a methodological limitation: the predominance of secondary, qualitative evidence in the existing literature constrains the ability to make precise, quantified claims about the magnitude of Islamic microfinance's educational impact. Future primary research employing household survey data, institutional financial records, and longitudinal outcome tracking is needed to strengthen the evidence base and enable more definitive impact assessment.

In conclusion, Islamic microfinance represents a viable, ethically grounded, and structurally sustainable complementary mechanism for financing S&T education in Nigeria—one whose potential remains substantially underutilized. Unlocking this potential requires not incremental adjustments but deliberate, systemic policy action: strengthening the regulatory infrastructure for Waqf and Zakat institutions, designing dedicated S&T educational financing schemes, building institutional capacity, and integrating Islamic microfinance explicitly within Nigeria's national educational development frameworks. If pursued with the requisite political commitment and cross-sector collaboration, the strategic integration of Islamic microfinance could make a meaningful contribution to narrowing Nigeria's S&T educational access and quality deficits, advancing human capital development, reducing poverty, and positioning the nation more competitively within the knowledge-based global economy.

RECOMMENDATIONS

Based on the evidence synthesized and the constraints identified in this review, the following targeted recommendations are directed at the principal stakeholders with authority and capacity to expand the role of Islamic microfinance in Nigeria's S&T education system:

1. Establish a Dedicated Government–Islamic Microfinance Coordination Framework: The Federal Ministry of Education and the Central Bank of Nigeria should jointly establish a formal coordination platform with Islamic microfinance institutions, designating S&T education as a

priority financing area within Islamic social finance policy. This framework should include co-financing arrangements, regulatory harmonization, and a clear mandate for monitoring educational outcomes—moving beyond ad hoc engagement toward institutionalized collaboration. State-level governments in educationally underserved regions should be incentivized to replicate this coordination architecture through federal matching funds tied to S&T educational enrolment targets.

2. Design Specialized S&T Educational Financing Schemes: Islamic microfinance institutions should develop financing products explicitly tailored to the cost structure and career trajectories of S&T education. Such schemes should feature income-contingent repayment arrangements aligned with graduate employment timelines, streamlined documentation requirements to reduce barriers for low-income applicants, and bundled service packages integrating educational loans with entrepreneurship training and business advisory support. Products should be designed with explicit gender-equity provisions to address the documented underrepresentation of female students in S&T disciplines.

3. Strengthen Legal and Institutional Frameworks for Waqf and Zakat Mobilization: Realizing the long-term financing potential of Waqf and Zakat for S&T education requires targeted legislative and institutional reform. Government should enact or revise Waqf legislation to clarify endowment property rights, streamline administrative procedures, and introduce tax incentives for new Waqf establishment. A national Zakat collection and allocation body—with transparent governance and ring-fenced S&T education allocations—should be operationalized or strengthened where nascent structures already exist. These reforms would unlock the estimated multi-billion-naira annual Zakat potential currently dissipated through informal channels (Hassan & Aliyu, 2023), directing it toward sustained educational financing.

4. Invest in Awareness Campaigns and Capacity Building: Government ministries, development partners, and civil society organizations should implement multi-channel awareness campaigns—delivered through community radio, religious institutions, and secondary schools—to inform target populations about available Islamic educational financing mechanisms, eligibility criteria, and application procedures. Parallel capacity-building programmes should equip Islamic microfinance practitioners with specialized knowledge of S&T education financing, outcome measurement methodologies, and educational technology integration, while educational administrators receive training in engaging and optimizing Islamic microfinance resources available to their institutions.

5. Integrate Islamic Microfinance Within National Educational Policy and Planning Instruments: Islamic microfinance should be explicitly named and resourced within Nigeria's National Policy

on Education, the Universal Basic Education Commission's operational frameworks, and Tertiary Education Trust Fund (TETFund) allocation guidelines. Policy integration would confer institutional legitimacy, attract complementary development financing, and create accountability mechanisms ensuring that Islamic microfinance contributions to S&T education are systematically tracked and reported. Development partners including the Islamic Development Bank and UNICEF should be engaged to co-finance policy implementation and provide technical assistance for institutional development.

6. Establish a Rigorous Monitoring, Evaluation, and Learning System: Given the current predominance of qualitative and secondary evidence in the literature—a limitation this review explicitly acknowledges—government agencies and academic research institutions should establish longitudinal monitoring and evaluation systems that track Islamic microfinance disbursements to S&T education, enrolment and retention outcomes, graduate employment and enterprise creation rates, and gender and geographic equity indicators. Findings should be publicly disseminated through an open-access evidence repository, enabling continuous program refinement and evidence-based policy development across government, institutional, and civil society stakeholders.

Policy implementation framework for integrating Islamic microfinance within Nigeria's science and technology education development strategy, specifying responsible stakeholders, required activities, implementation timelines, and performance indicators.

Table 1. Policy Implementation Framework

Policy Element	Key Activities	Responsible Stakeholders	Timeline	Performance Indicators
Institutional Collaboration	Establish government-IMF coordination committees	Federal and State Education Ministries, IMF Associations	6–12 months	Committees established, MOUs signed
Specialized Schemes	Design and pilot S&T education financing schemes	Islamic Microfinance Institutions, Technical Experts	12–18 months	Schemes operationalized, loans disbursed
Awareness Campaigns	Implement multi-channel awareness initiatives	Civil Society, Media, Education Agencies	Ongoing	Awareness levels measured
Monitoring & Evaluation	Establish M&E framework and data systems	Statistics Bureau, Research Institutions	6 months	M&E system operational, baseline data collected

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