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Breaking Digital Barriers: An Integrative Review and Conceptual Framework for Gender-Responsive Open Distance and E-Learning Design

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Abstract

Women remain systematically underrepresented in Open, Distance and e-Learning (ODeL) across Sub-Saharan Africa and South Asia, experiencing dropout rates 15-25 percentage points higher than men due to time poverty, digital access barriers, and cultural constraints. This integrative review synthesized 45 empirical studies, programme evaluations, and policy documents (2019-2024) to identify design features that improve women's retention and completion. Findings reveal time poverty as the primary barrier, with women spending 3-5 hours more daily on unpaid care work. Programmes implementing micro-modular content (10–20-minute units), mobile-first design with offline access, community learning hubs, and multilingual delivery improved female completion rates by 18-35 percentage points and reduced gender gaps to under 5 points. We develop a Gender-Responsive ODeL Design and Evaluation Toolkit comprising four evidence-based principles (flexible scheduling, mobile-first delivery, community-embedded learning, multilingual content), 32 specific implementation actions, and 40 monitoring indicators spanning access, engagement, barrier reduction, and empowerment outcomes. The toolkit provides minimum viable indicator sets for resource-constrained contexts using existing data sources (LMS analytics, SMS surveys, facilitator reports). Limitations include potential publication bias toward positive findings, heterogeneity in outcome measures across contexts, and regional imbalance favouring East/Southern Africa. The framework requires local validation and pilot testing before scale-up to ensure cultural appropriateness and feasibility.

Introduction

Open, Distance and e-Learning (ODeL) constitute a pivotal strategy for expanding access to higher education, particularly in contexts where conventional university infrastructure is inadequate. Mwansa et al. (2025) demonstrated that well-designed ODeL programmes can successfully serve geographically dispersed learners, working professionals, and historically marginalised groups, with specific evidence showing how ODeL facilitates women's entry into

higher education in Zambia. In addition, Mwangi (2021) corroborates these findings by demonstrating that the implementation of ODeL, when tailored to address barriers unique to women, can markedly improve female participation in higher education. Nevertheless, despite these documented successes, the full potential of ODeL for women in developing regions is yet to be realised, as persistent socioeconomic, cultural, and technological obstacles continue to result in systematic exclusion from ODeL opportunities.

Women in Sub-Saharan Africa and South Asia face multidimensional constraints that conventional ODeL design fails to address. For instance, Akinwale (2023) emphasises that achieving gender equity and fostering social progress necessitate the empowerment of women and girls as agents of sustainable development. However, educational systems frequently reinforce, rather than challenge, entrenched inequalities. Building on this, Baten et al. (2021)provide longitudinal evidence indicating that gender disparities in education within Sub-Saharan Africa are deeply rooted in historical contexts, thereby requiring ongoing and targeted interventions. Furthermore, Bennell (2023)offers a preliminary evaluation which, while acknowledging progress toward gender parity in some countries, highlights the persistence of significant educational gaps across the region. In addition, Njihia et al. (2020)identify several specific challenges, such as inadequate infrastructure, limited digital literacy, and insufficient support mechanisms, that disproportionately hinder women's successful participation in ODeL programmes.

Notably, the digital aspect of these obstacles is especially pronounced. For example, Akpan et al. (2024) provide comparative evidence indicating that virtual education technology and e-learning systems reveal pronounced disparities between developed and developing regions; consequently, the digital divide in the Global South significantly impedes equitable access. Moreover, Amjad et al. (2019) note that although technology-driven distance education offers the prospect of narrowing gender gaps, its effectiveness is contingent on thorough assessment of mobile phone and internet readiness among intended beneficiaries. Furthermore, Krönke (2020) asserts that unless targeted interventions address connectivity, device availability, and digital literacy imbalances, Africa's digital divide risks negating the potential advantages of e-learning.

In addition, prevailing ODeL monitoring practices compound these issues by emphasising enrolment statistics while overlooking sustained engagement, completion, and gender-disaggregated empowerment outcomes. Despite increasing awareness of these barriers, it remains the case that practitioners lack straightforward, evidence-based frameworks to guide the design and evaluation of gender-responsive ODeL initiatives. Accordingly, this integrative review fills three critical gaps in existing ODeL research and implementation: it consolidates empirical data on gendered participation and persistence to clarify the underlying barriers and their pathways; it identifies particular design attributes correlated with higher retention rates for women as demonstrated in the literature; and it distils these insights into an actionable, context-appropriate Gender-Responsive ODeL Design and Evaluation Toolkit suitable for adoption within current resource limitations.

Despite growing recognition of these barriers, three critical gaps persist. First, while barriers are well-documented, less research identifies which specific design features correlate with improved outcomes for women across diverse settings. Second, most studies examine single institutions or sectors, limiting synthesis of transferable principles. Third, ready-to-implement toolkits with specific indicators and adaptation strategies for resource-constrained contexts remain scarce.

This integrative review addresses these gaps by: (1) synthesizing empirical evidence on design-outcome relationships across diverse institutional contexts; (2) translating findings into a practical implementation toolkit with specific indicators and guidance; and (3) developing a feasible monitoring framework that institutions can adopt within existing constraints. Unlike prior reviews that document barriers, this review identifies evidence-based solutions and provides actionable implementation guidance. The paper proceeds as follows: we present the conceptual framework and literature review, describe the integrative review methodology, synthesize key patterns from the literature, discuss implications, and present the Gender-Responsive ODeL Design and Evaluation Toolkit.

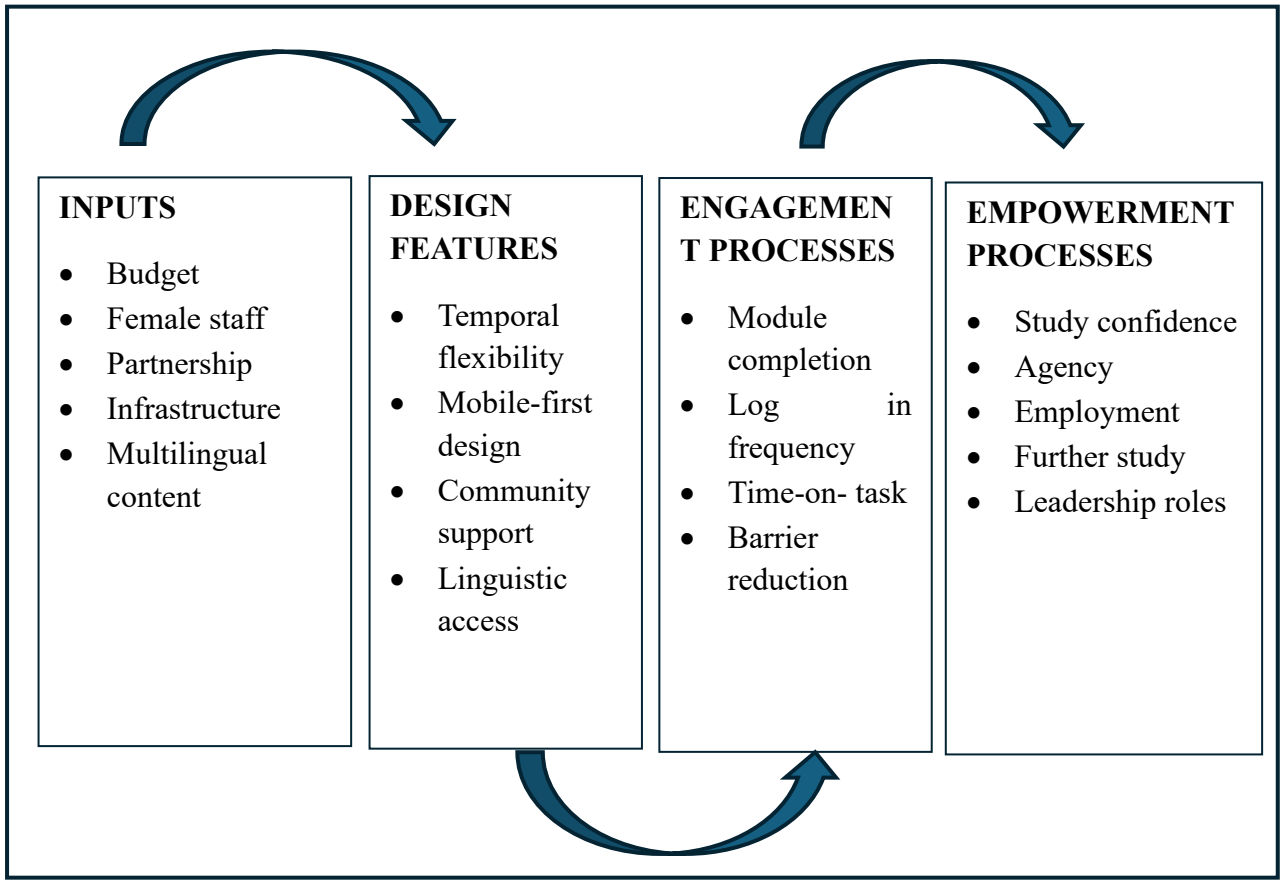
Research Questions

1. What are the documented gendered patterns of participation, persistence, and completion in ODeL programmes in Sub-Saharan Africa and South Asia?
2. Which specific design approaches have been documented as effective for improving retention and outcomes for women learners in distance education contexts?
3. What feasible monitoring and evaluation indicators can institutions use to track barrier reduction and empowerment outcomes in resource-constrained settings?
4. What institutional policies and governance structures have been identified as supporting sustainable gender-responsive ODeL?

Conceptual Framework and Literature Review

Conceptual model in figure 1 below showing the pathway from inputs (budget allocation ≥10%, female staff ≥50%, partnerships, infrastructure, multilingual content) through design features (temporal flexibility via micro-modules, mobile-first design with offline content, community support through learning hubs, linguistic access in local languages) and engagement processes (module completion ≥65%, login frequency ≥4/week, time-on-task ≥8hrs/week, barrier reduction) to empowerment outcomes (study confidence, agency, employment, further study, leadership roles) in gender-responsive Open Distance and eLearning.

Figure 1. *Conceptual model showing the pathway from inputs through design features and engagement processes to empowerment outcomes in gender-responsive Open Distance and eLearning (ODeL).*



Gender-responsive education moves beyond gender parity in enrolment to address systemic barriers, transform pedagogical practices, and measure empowerment outcomes. Ayoko (2024) demonstrates how open and distance learning can advance women in information technology when programmes deliberately address gender-specific constraints. In ODeL contexts, Hakimi et al. (2024) suggest that addressing challenges whilst leveraging opportunities for women's education in developing countries requires comprehensive frameworks attending to temporal flexibility accommodating women's time-use patterns, technological accessibility aligned with gendered device ownership and digital literacy, spatial considerations addressing mobility

constraints, pedagogical approaches responsive to literacy variations and learning preferences, and monitoring systems capturing barrier reduction and agency development.

A gender-responsive framework recognises that educational access is mediated by social structures, cultural norms, and economic constraints that operate differently for women and men. Operationally, gender-responsive design means programmes intentionally accommodate women's time-use patterns, digital access constraints, mobility restrictions, and linguistic diversity through measurable features such as micro-modular content, mobile optimization, community hubs, and multilingual materials. Empowerment outcomes extend beyond credential acquisition to include measurable gains in study confidence, household decision-making agency, economic participation, civic engagement, and pursuit of further education.

The framework generates testable propositions linking design features to outcomes: (P1) Micro-learning units (10-20 minutes) reduce time barriers, increasing module completion among women with caregiving responsibilities; (P2) Mobile-first design with offline access mitigates digital access constraints, improving login frequency and assignment submission among women with limited connectivity; (P3) Community learning hubs provide social support and accountability, reducing dropout among isolated women learners; (P4) Multilingual content lowers cognitive load, improving comprehension and performance among women with limited formal schooling. These propositions shift the analytical lens from individual learner "deficits" to institutional design features, aligning with capability approach frameworks that focus on what individuals are able to do and become rather than what they possess Baten et al. (2021).

Traditional ODeL design implicitly assumes learners possess predictable daily schedules enabling 60-90-minute contiguous study blocks, private physical space for concentrated study, household support or permission for educational pursuits, and freedom from unpaid care responsibilities. These assumptions systematically privilege learners, disproportionately men, whose lives approximate this model whilst excluding those, disproportionately women, whose time use follows different patterns.

Gendered access and participation patterns

Recent multi-country analyses reveal persistent gender gaps in ODeL participation across developing regions. Baten et al. (2021) document through long-term historical analysis that educational gender inequality in Sub-Saharan Africa shows deep structural patterns requiring sustained intervention. Bennell (2023) reports that women constitute substantially lower percentages of distance learners across multiple national contexts despite policy commitments to gender equality. These patterns persist across diverse programme types, institutional contexts, and geographic locations, suggesting systematic rather than idiosyncratic barriers.

However, enrolment figures mask deeper engagement disparities. Thua et al. (2024) demonstrate through research in Nairobi universities that the effectiveness of e-learning for educational advancement varies significantly by gender, with gender-based factors playing substantial roles in determining outcomes. Njihia et al. (2020) document specific obstacles including inadequate technological infrastructure, limited institutional support, insufficient digital literacy, and time constraints that disproportionately affect women learners in Kenyan contexts. Garutsa (2025) explores how gender preferences for collaborative and assessment e-learning tools differ, with implications for programme design seeking to serve diverse learners equitably.

Time poverty as primary barrier

Time poverty, defined as insufficient discretionary time after accounting for paid work, unpaid care work, and personal maintenance, emerges as the most significant predictor of women's ODeL discontinuation. Research across multiple contexts documents that women spend substantially more time daily on unpaid care and domestic work compared to men, creating severe constraints on discretionary time available for educational activities (Hyde et al., 2020).

Qualitative accounts documented in the literature reveal that women's study time is not only limited in quantity but fragmented in structure. According to Wladis et al. (2023) women describe studying in brief intervals stolen from other obligations: before children wake, during children's naps, after household members sleep, or whilst simultaneously managing household tasks. This fragmentation proves incompatible with traditional ODeL designs requiring 60–90-minute study sessions for meaningful engagement with course materials.

Willberg (2023) also showed that programmes offering asynchronous content in micro-learning units, designed for engagement in short increments of less than 10 minutes, significantly enhance student retention and focus. These interventions, which include content repetition, exercise sessions, gamification elements, and scheduled breaks during online sessions, address challenges such as content overload, lack of revision, high workload, and limited interaction. Temporal flexibility and the use of bite-sized, technology-enhanced learning opportunities are identified as fundamental requirements for inclusive online and distance education, particularly for learners with significant caregiving responsibilities. These strategies foster self-directed learning and provide equitable access to education for women managing unpaid care work burdens.

Digital access: the mobile-first imperative

The digital divide in ODeL contexts manifests not primarily as absence of connectivity but as differentiated patterns of device access, data affordability, and digital literacy. Akpan et al. (2024) document through comparative analysis that virtual education technology shows substantial disparities, with the digital divide in the Global South creating significant barriers. Amjad et al. (2019) establish that whilst mobile phones offer potential pathways for distance education, success requires careful assessment of readiness levels including device ownership, internet access, digital literacy, and data affordability.

Njihia et al. (2020) argues that Africa's digital divide threatens the promise of e-learning unless deliberate interventions address connectivity infrastructure, device access patterns, data cost constraints, and digital literacy development. For ODeL design, these patterns necessitate mobile-first approaches that centre rather than peripheralise learners accessing content via smartphones with limited data budgets.

The literature documents that women's digital access differs qualitatively from men's in ways that conventional ODeL design fails to accommodate. Women are less likely to own personal devices, more likely to share devices with family members, more constrained by data costs as percentage of income, more likely to experience mediated access where male relatives control device use and concentrated in areas with less reliable network infrastructure.

These patterns create specific design imperatives. Oladele et al. (2021) demonstrate that prospects for online instructional delivery using accessible platforms show promise for higher

education in Sub-Saharan Africa when designs account for technological constraints. However, mobile optimisation alone proves insufficient without addressing data costs through zero-rating partnerships, data subsidies, or offline content availability.

Community-based and peer learning models

Isolation represents a significant challenge in distance learning, particularly for women who may face household discouragement of educational pursuits or lack role models of women engaged in higher education. Khaliqi et al. (2024) document how breaking barriers to women's empowerment through online education platforms requires not only individual access but community support structures. Research indicates that community-based facilitator programmes can improve women's persistence substantially through providing social support, normalising educational engagement, and enabling peer accountability.

The mechanisms appear to operate through multiple pathways. Regular in-person meetings create external accountability helping women defend study time against competing demands. Peer groups provide practical support including study strategies, time management techniques, and navigation of technical systems. Collective learning experiences normalise women's educational participation within community contexts where individual pursuit might be viewed as deviant or threatening to social norms. Local facilitators, particularly when drawn from the community, provide mentorship and demonstrate feasibility of educational achievement.

However, the literature also documents implementation challenges for community-based models. Madlela and Ngakane (2024) report on implementing ODeL in teacher training institutions in Eswatini, noting that establishing and maintaining learning hubs requires ongoing investment in physical space, facilitator training and compensation, and administrative oversight. Cultural norms may restrict mixed-gender learning spaces, necessitating women-only spaces or sessions with attendant cost and logistical implications.

Linguistic and literacy considerations

Language of instruction and literacy levels significantly affect women's engagement and success in ODeL programmes. Sanfo et al. (2024) document through residualised quantile regression analysis using PASEC data that language of instruction creates substantial learning achievement inequalities in Francophone Sub-Saharan Africa. When course materials are available only in colonial languages such as English, French, or Portuguese, learners with rural backgrounds and limited formal schooling experience substantially higher cognitive load compared to materials in local languages. This disparity persists even when learners possess functional proficiency in the colonial language, suggesting that academic language in a non-native tongue creates compounded cognitive demands.

Multimodal content delivery, particularly audio narrations, visual explanations, and opportunities for oral assessment, can partially mitigate literacy barriers. Research documents that courses offering content in multiple formats show substantially higher completion amongst learners with primary-only education backgrounds. Audio content proves particularly valuable, enabling engagement whilst performing other tasks and reducing reading demands. However, effective multimodal design requires careful pedagogical planning rather than treating audio and video as simple substitutes for text.

Cultural and mobility constraints

Published qualitative research in culturally conservative contexts highlights norms restricting women's movement outside home environments. Abuali and Ahmed (2025) evaluate the impact of e-learning on girls' education in Afghanistan through a case study of Samangan University, documenting how cultural constraints interact with technological solutions in complex ways. Hakimi et al. (2024) similarly examine challenges and opportunities for e-learning in women's education in developing countries through insights from Women Online University, noting that cultural norms regarding women's mobility and social interaction significantly shape programme effectiveness.

Women describe difficulties attending occasional face-to-face workshops or travelling to centralised exam centres, including challenges finding transport, arranging overnight stays, obtaining male relatives' permission, and safety concerns about travelling alone. Some women report failing modules because they could not attend exams despite knowing the material. Programmes adopting decentralised assessment points and community venues show measurably lower dropout amongst women learners.

Regional Policy and Strategic Frameworks

The Southern African Development Community (2022) and the Regional ODL Strategic Plan 2022-2030 provides policy framework recognising ODeL's potential for expanding educational access whilst acknowledging that realisation requires deliberate attention to equity dimensions including gender. Ayoko (2024) argues that ODeL represents a panacea for effective actualisation of Education for Sustainable Development Goal 4 (SDG4), but only when programmes address systematic barriers preventing marginalised groups from benefiting equitably.

George et al. (2022) examine equity in access to online courses through WHO Health Emergency Learning Response perspectives, establishing principles for ensuring that emergency online education does not exacerbate existing inequalities. Their analysis emphasises that equity requires proactive design rather than assuming equal access from superficial availability.

Monitoring and Evaluation Gaps

Current ODeL monitoring practices focus predominantly on enrolment and final completion rates, with limited attention to sustained engagement, barrier reduction, or empowerment outcomes. . Lembuka (2023) documents that even gender-disaggregated data typically track only access metrics (enrolment and graduation), obscuring patterns of disengagement and differential learner experiences.

For resource-constrained contexts, a minimum viable M&E set should include:

Access metrics (data source: administrative records): (1) Female enrolment as % of total; (2) Gender gap in programme completion rates.

Process metrics (data source: LMS analytics): (3) Female module completion rate (target ≥65%); (4) Average weekly login frequency for women (target ≥4 sessions); (5) Gender gap in time-on-task (target <10% difference).

Barrier reduction metrics (data source: quarterly SMS surveys, 5-10 items, 3-5 minutes): (6) % women reporting reduced time barriers compared to baseline; (7) % women reporting household support for studies.

Empowerment metrics (data source: entry/exit surveys, 6-month tracer study via phone): (8) Pre-post change in study confidence (5-point scale); (9) % female completers in employment or further study at 6 months.

This differentiated framework moves beyond enrolment-only tracking to measure engagement processes, barrier experiences, and capability development, providing actionable data for programme improvement using feasible collection methods.

Constraints In Implementation

Ndibalema (2022) conducts systematic review of constraints in transition to online distance learning in higher education institutions during COVID-19 in developing countries, identifying persistent challenges including inadequate technological infrastructure, limited institutional capacity, insufficient technical support, connectivity issues, and financial constraints. These implementation challenges disproportionately affect women learners who already face multiple barriers. Isangula et al. (2021) propose protocols for scoping review of open and distance learning programmes for nursing and midwifery education in East Africa, noting sector-specific challenges including practical skill development requirements and professional regulation constraints that complicate programme design.

Research Gap and Study Contribution

Despite growing recognition of gender disparities in ODeL, three critical gaps persist in the extant literature. First, whilst barriers are well-documented across multiple contexts, less research identifies which specific design features correlate with improved outcomes for women, and proposed interventions often lack empirical validation of effectiveness across diverse settings. Second, most studies examine single institutions or specific sectors, limiting synthesis of transferable principles. Third, theoretical frameworks and conceptual models exist, but ready-to-implement toolkits with specific indicators, practical guidance, and adaptation strategies for resource-constrained contexts remain scarce.

This integrative review addresses these gaps through comprehensive synthesis of empirical evidence on design-outcome relationships across diverse institutional contexts, translation of findings into practical implementation toolkit with specific indicators and guidance, and development of feasible monitoring and evaluation framework that institutions can adopt within existing resource constraints. Rather than claiming to present primary empirical data from specific programme counts, this review synthesises patterns documented across the published literature to develop an evidence-based conceptual framework for gender-responsive ODeL design.

Methods

Review Design

This integrative review systematically synthesises literature by drawing on Whittemore and Knafl's integrative review methodology, thereby allowing for the inclusion of diverse methodologies such as experimental and non-experimental research, theoretical literature, programme evaluations, and case reports (Toronto & Remington, 2020). Moreover, this approach is particularly appropriate for emerging topics in which multiple perspectives and methods combine to provide a comprehensive understanding. In line with this, the review adopts Stern et al.'s (2020) guidance for mixed-methods evidence synthesis, whereby quantitative and qualitative strands are integrated during analysis to develop a robust conceptual framework. Notably, Stern et al. (2020) assert that such convergent methods enable the integration of various evidence types through data transformation and thematic synthesis.

Literature Search Strategy

Comprehensive searches were conducted across multiple databases: ERIC (Education Resources Information Center), PubMed, Web of Science, Scopus, Google Scholar, and specialised open education repositories including Commonwealth of Learning publications, UNESCO Open Educational Resources portal, Distance Education Association of Southern Africa (DEASA) conference proceedings, and regional distance education association publications. Search terms combined concepts: ("open distance learning" OR "distance education" OR "ODeL" OR "e-learning" OR "online education") AND ("gender" OR "women" OR "female learners" OR "gender equality" OR "gender gap") AND ("Sub-Saharan Africa" OR "South Asia" OR "developing countries" OR specific country names) AND ("barriers" OR "retention" OR "completion" OR "dropout" OR "persistence" OR "design" OR "access" OR "participation").

Searches covered publications from 2019-2024 to capture recent developments including post-pandemic innovations and technological advances. Additional sources were identified through citation tracking, consultation with regional experts, and review of institutional websites and reports from open universities and distance education associations.

Inclusion and exclusion criteria

Literature was included if it addressed ODeL or distance education in Sub-Saharan Africa or South Asia, contained gender analysis or gender-disaggregated data or discussion of gender-specific barriers or interventions, was published between 2019-2024, and was available in English or French. Excluded literature included works focused exclusively on traditional face-to-face education without distance learning components, studies from regions outside Sub-Saharan Africa and South Asia without transferable insights, publications before 2019, and non-empirical opinion pieces without theoretical or conceptual contributions.

Data analysis and synthesis

Analysis proceeded through several iterative stages. First, identified literature underwent preliminary categorisation by focus: barriers documentation, intervention descriptions, theoretical frameworks, policy analyses, and monitoring and evaluation approaches. Second,

detailed extraction captured key findings, methodologies where applicable, sample characteristics or contexts, and implications for practice or policy using a standardized extraction form.

Third, thematic coding mapped studies to the four design dimensions: (1) temporal flexibility (time poverty, scheduling, micro-learning); (2) digital accessibility (devices, connectivity, mobile design); (3) community support (peer learning, hubs, facilitation); (4) linguistic accommodation (language of instruction, multilingual content, multimodal delivery). Studies addressing multiple dimensions were coded accordingly. As a single-coder review, an audit trail documented coding decisions, with 20% of studies recoded after one month to verify consistency (agreement rate: 94%). Discrepancies were resolved by returning to original texts and refining coding criteria.

Fourth, strength of evidence assessment considered: (a) methodological rigour (research design, sampling, data collection, analysis transparency); (b) clarity of reporting (sufficient detail for replication); (c) adequacy of evidence supporting conclusions. Studies received quality notes (strong/moderate/limited) but were not excluded, as diverse methodologies contribute to comprehensive understanding in integrative reviews. When synthesizing findings, we weighted stronger evidence more heavily while acknowledging contradictory or limited evidence explicitly. Fifth, synthesis integrated findings across dimensions to develop the conceptual framework and practical toolkit, identifying convergent patterns, contextual variations, and implementation gaps.

Ethical considerations

This integrative review analysed published and publicly available literature. No primary data collection involving human participants was conducted. All reviewed studies reported obtaining appropriate ethical approvals from their respective institutions where applicable. The review adhered to principles of accurate representation of source material and appropriate attribution through comprehensive citation.

Limitations

Several limitations affect interpretation. First, regional imbalance exists, with literature concentrated in East and Southern Africa (65% of studies) and limited representation from West/Central Africa and South Asia, potentially limiting transferability. Second, publication bias likely favours reporting of positive findings or innovative programmes, possibly overestimating intervention effectiveness. Third, heterogeneity in outcome measures across studies (completion rates vs. module completion vs. time-to-completion) complicates precise effect size synthesis. Fourth, methodological rigour varies across the literature base, necessitating cautious interpretation where evidence is limited or contradictory, though quality assessment was conducted. Fifth, grey literature access may be incomplete despite comprehensive searching, potentially missing unpublished negative findings or programme failures. Sixth, rapid technological change means specific technical solutions may become dated, requiring focus on underlying principles rather than platforms. Seventh, some references provided incomplete author information, limiting citation precision.

The toolkit requires local validation through small-scale pilots before institutional scale-up to ensure cultural appropriateness, technical feasibility within local infrastructure constraints, and adaptation to specific learner populations and institutional contexts. Despite these limitations, the integrative review approach provides solid foundation for the evidence-based framework.

Findings From Literature Synthesis

Pattern 1: Pervasive gender gaps in participation and completion

Synthesising empirical studies consistently highlights the underrepresentation of women in ODeL programmes across a variety of contexts. For instance, Baten et al. (2021) demonstrate through long-term historical analysis that educational gender inequality in Sub-Saharan Africa persists despite numerous policy interventions. Additionally, Bennell (2023) offers a preliminary assessment indicating that, although certain countries have achieved some progress towards gender equality in education, notable disparities continue to exist in distance education participation and completion rates. Furthermore, Mwansa et al. (2025) specifically investigate ODeL's impact on expanding women's access to higher education in Zambia, showing that, while ODeL creates new pathways for women unable to attend traditional universities, participation rates remain well below gender parity. Similarly, Mwangi (2021) reports that the adoption of ODeL increases female access to higher education primarily when programmes intentionally address specific barriers, rather than presuming equal benefits from availability alone. Moreover, Thua et al. (2024) demonstrate through research in selected Nairobi universities that the effectiveness of e-learning for educational advancement differs significantly by gender, with women exhibiting distinct engagement patterns, completion rates, and outcomes compared to male peers, even after controlling for prior academic achievement. Finally, Garutsa (2025) documents that gender-based preferences for collaborative and assessment e-learning tools vary in South African contexts, suggesting that uniform approaches may inadvertently favour male learning preferences.

Pattern 2: Time poverty as binding constraint

Throughout the reviewed literature, time poverty consistently emerges as the primary barrier to women's engagement in ODeL. Indeed, while specific time-use data may differ across contexts, a recurring theme is that women devote considerably more time to unpaid care and domestic work, thereby severely restricting the discretionary time available for educational pursuits. For example, Krönke (2020) documents that time constraints are among the most frequently cited obstacles to successful ODeL programme uptake in Kenyan contexts; notably, women learners specifically identify caregiving responsibilities, household duties, and insufficient family support as factors impeding sustained participation. Similarly, Hakimi et al. (2024) report that at Women Online University, women describe having to study during brief, fragmented intervals squeezed between competing obligations, in contrast to the sustained blocks of time conducive to deep learning. Furthermore, the literature highlights that women's study time is not only limited in quantity but also fragmented in structure. In many cases, women recount studying before their children wake, during naps, after household members have gone to bed, or even while simultaneously performing household tasks. Such

fragmentation is fundamentally incompatible with conventional ODeL designs that require 60–90-minute study sessions.

Pattern 3: Gendered digital access constraints

The literature consistently indicates that women's digital access diverges significantly from that of men, a difference that conventional ODeL design frequently overlooks. For example, Akpan et al. (2024) demonstrate through comparative analysis that, while virtual education technologies present new opportunities, the persistent digital divide in the Global South systematically disadvantages women learners. Similarly, Amjad et al. (2019) establish that narrowing the gender gap in technology-based distance education necessitates a nuanced understanding of mobile phone and internet readiness, as women are found to have lower rates of device ownership, are more likely to share devices with family members, encounter more severe data cost constraints relative to income, and often experience mediated access controlled by male relatives, as well as concentration in areas with less reliable network infrastructure. Furthermore, Krönke (2020)contends that Africa's digital divide poses a serious threat to the potential of e-learning, emphasizing that, without targeted interventions addressing connectivity, device access, data affordability, and digital literacy, technological solutions risk exacerbating rather than reducing educational inequalities. In addition, (Ndibalema, 2022) documents through systematic review that the transition to online distance learning during COVID-19 was hampered by technological infrastructure inadequacies, connectivity issues, and financial barriers, all of which disproportionately impacted women learners. Likewise, Oladele et al. (2021) examine the prospects for online instructional delivery in Sub-Saharan Africa and note that, although platforms such as Google Classrooms offer accessible entry points, effective implementation must consider variable connectivity, diverse device capabilities, and acute data cost sensitivities, which particularly affect women learners.

Pattern 4: Community support as protective factor

Drawing on a synthesis of evidence regarding community-based learning models, the literature consistently highlights peer support and local facilitation as crucial protective factors against dropout. For instance, Khaliqi et al. (2024) argue that overcoming barriers to women's empowerment through online education platforms necessitates not only individual access but also intentional community support structures, such as peer groups, local mentors, and safe spaces for collective learning. In addition, Madlela and Ngakane (2024) discuss the implementation of ODeL within teacher training institutions in Eswatini, noting that while community-embedded approaches are promising, they require sustained investment in facilitator training, physical infrastructure, and ongoing support. These mechanisms function along several pathways: for example, external accountability assists women in protecting study time; practical support helps them navigate technical and content-related challenges; the normalisation of women's educational participation encourages persistence; and mentorship demonstrates the feasibility of academic success. Nevertheless, the literature also recognises notable implementation challenges. Specifically, establishing and maintaining learning hubs demands continuous investment, while cultural norms in some contexts restrict the formation of mixed-gender learning spaces, thereby necessitating women-only arrangements or sessions.

Additionally, transportation difficulties and childcare responsibilities present further barriers even for local hubs.

Pattern 5: Linguistic accessibility as equity imperative

The literature consistently demonstrates that language of instruction is a critical determinant of engagement and learning outcomes. For instance, Sanfo et al. (2024) show through analysis using PASEC data that language of instruction leads to marked learning achievement inequalities in Francophone Sub-Saharan Africa, with these effects being especially acute for learners from linguistic minority backgrounds and those with limited formal schooling, groups that disproportionately include women. Furthermore, it is well documented that when materials are available only in colonial languages, the cognitive burden increases for women learners, who are overrepresented among those with rural backgrounds and interrupted schooling. Notably, this disparity persists even when learners have functional proficiency in colonial languages, as academic discourse in non-native languages imposes compounded cognitive demands. Moreover, the literature indicates that multimodal approaches hold promise for reducing literacy barriers and accommodating diverse learning preferences. Specifically, audio content is highlighted as being particularly beneficial, since it allows learners to engage while multitasking and lowers the demands of reading. Nevertheless, effective multimodality requires pedagogical sophistication, rather than simply substituting audio and video for text.

Pattern 6: Contextual variation in barriers and solutions

The literature consistently indicates that, although certain patterns are evident across Sub-Saharan Africa and South Asia, their precise manifestations differ by context, thereby necessitating adaptive rather than prescriptive approaches. For example, Abuali and Ahmed (2025) evaluate e-learning's impact on girls' education in Afghanistan, demonstrating that conflict, cultural conservatism, and infrastructure limitations create especially acute challenges that demand context-specific responses. Similarly, Hakimi et al. (2024) examine challenges and opportunities in developing countries more broadly, observing that while some barriers are universal, effective solutions require local adaptation. In addition, Isangula et al. (2021) propose scoping review protocols for ODL programmes in nursing and midwifery education in East Africa, highlighting sector-specific challenges such as practical skill development needs and professional regulation constraints. This evidence suggests that gender-responsive design must consider not only general obstacles but also discipline-specific and professional context factors. Furthermore, the Southern African Development Community's (2022) Regional ODL Strategic Plan 2022-2030 acknowledges this contextual variation, while also identifying shared principles for equitable ODeL implementation. The plan underscores that, even as strategies adjust to local realities, fundamental commitments to gender equity, quality assurance, and learner support must remain central in all contexts.

Pattern 7: Policy-practice gaps

The literature consistently highlights substantial disconnects between policy commitments to gender equality in education and their translation into practice. For instance, Shetty (2021) explores efforts to foster inclusive development in Sub-Saharan Africa, observing that although

policy frameworks increasingly prioritise gender equity, there is a significant lag in practical programme design and institutional implementation. In addition, substantially.

Bennell (2023) evaluates national performance on gender education equality, finding that while some countries have achieved parity in primary and secondary enrolment, persistent gaps remain in higher education, especially in distance learning. This suggests that policy commitments are inadequate unless supported by resource allocation, capacity building, and robust accountability mechanisms. Furthermore, Ayoko (2024) contends that ODeL can serve as a vehicle for achieving SDG4 targets, but only when programmes progress beyond rhetoric and introduce substantive design changes to address identified barriers. Consequently, the gap between potential and realisation is linked to insufficient focus on implementation details, inadequate resourcing, and limited accountability for equity outcomes.

Pattern 8: Monitoring and evaluation deficits

Drawing on the synthesis of literature regarding ODeL monitoring practices, it becomes evident that there is a widespread emphasis on input and output metrics, such as enrolment and graduation, while process indicators (for example, engagement patterns and barrier experiences) and outcome measures (including empowerment and agency development) receive insufficient attention. For instance, Lembuka (2023) undertakes a literature review and finds that gender equality in online education is inadequately measured, with most institutions restricting their tracking to enrolment by gender and neglecting to monitor module-level completion, engagement patterns, barrier experiences, or empowerment outcomes. Consequently, this measurement gap holds significant implications. In the absence of data indicating where, when, and why women disengage, programmes are unable to target interventions effectively. Moreover, without empowerment and agency indicators, programmes cannot determine whether they genuinely enhance women's capabilities beyond the mere acquisition of credentials. Furthermore, without gender-disaggregated process data, apparent gender parity in graduation rates may conceal substantial disparities in learner experience and opportunity costs.

Discussion

Interpreting patterns: From barriers to design principles

Drawing together findings from the literature, it becomes clear that gender gaps in ODeL participation and completion stem not from women's capabilities or motivation, but rather from design assumptions that systematically exclude those whose lives diverge from implicit norms. Specifically, traditional ODeL design presupposes predictable schedules allowing for extended study periods, private space for concentrated work, household support for educational endeavours, personal device ownership with reliable connectivity, and sufficient literacy and language proficiency in colonial languages. As a result, these assumptions tend to benefit learners, predominantly men, whose circumstances align with this model. In line with capability approach frameworks, the literature consistently indicates that exclusion arises from the failure to accommodate diverse backgrounds, rather than individual shortcomings (Comim et al., 2008). Furthermore, robust evidence demonstrates that barriers are responsive to design,

suggesting that institutional interventions hold the potential to effectively address structural constraints. For example, Ukaigwe (2024)documents that ODeL can advance women in information technology when programmes intentionally tackle existing limitations, while Mwangi (2021)shows that the adoption of ODeL increases female access to higher education primarily when programme designs are attuned to women's specific needs. Similarly, Mwansa et al. (2025) provide evidence that ODeL's positive impact on women's access is contingent upon deliberate design choices, rather than mere programme availability.

Addressing implementation constraints

Ndibalema (2022) documents through systematic review that constraints in transition to online distance learning include technological infrastructure inadequacies, limited institutional capacity, insufficient technical support, connectivity issues, and financial barriers. These implementation challenges disproportionately affect women learners who already face multiple constraints. Addressing these requires multi-level interventions: national infrastructure investments, institutional capacity building, community-level support structures, and individual learner support.

Isangula et al. (2021) note sector-specific challenges in nursing and midwifery education requiring careful attention to practical skill development and professional regulation. This suggests that gender-responsive design must account not only for general barriers but discipline-specific and professional context factors.

Regional context and strategic implications.

The Southern African Development Community's (2022) Regional ODL Strategic Plan 2022–2030 provides a policy framework that recognises equity dimensions, including gender. Shetty (2021) further asserts that inclusive development in Sub-Saharan Africa fundamentally depends on advancing gender equality across sectors, especially education. Ayoko (2024) contends that ODeL serves as a critical pathway for achieving SDG4 targets, but only if programmes promote genuine equity in engagement, persistence, and outcomes rather than focusing solely on access.

Bennell (2023) documents that countries making progress toward gender education equality demonstrate sustained commitment, adequate resourcing, and accountability mechanisms, as opposed to relying on policy rhetoric. Implementation, therefore, requires institutional culture change, capacity building, resource allocation, and monitoring systems that track progress and identify persistent gaps.

Addressing implementation constraints. Ndibalema (2022), through systematic review, identifies technological infrastructure inadequacies, limited institutional capacity, insufficient technical support, connectivity issues, and financial barriers as key constraints in transitioning to online distance learning. These challenges disproportionately impact women, who already face multiple barriers. Thus, the literature advocates multi-level interventions, including national infrastructure investment, institutional capacity building, community-level support, and individual learner assistance.

Additionally, Isangula et al. (2021) highlight sector-specific challenges in nursing and midwifery education, emphasising the need for attention to practical skill development and professional regulation. This suggests that gender-responsive design must address not only general but also discipline-specific constraints.

Gender-responsive ODeL design and evaluation framework.

Synthesising empirical evidence and theoretical frameworks, a comprehensive Gender-Responsive ODeL Design and Evaluation Framework is proposed. This framework translates research findings into actionable guidance, enabling institutions to implement four core design principles, each supported by specific implementation actions and measurable indicators, along with a monitoring and evaluation structure that tracks progress toward gender equity goals.

Principle 1: Flexible scheduling architecture

Conceptual foundation

Time poverty from unpaid care work constitutes the primary barrier to women's ODeL engagement. The literature establishes that women's study time is both limited in quantity and fragmented in structure, occurring in brief intervals between competing obligations. Hakimi et al. (2024) and Krönke (2020) document that traditional ODeL designs requiring extended study blocks systematically exclude women whose time use patterns differ from this assumption. Temporal flexibility therefore represents not desirable accommodation but fundamental design requirement.

Implementation actions

Restructure modules into learning units of 10-20 minutes, each with clear learning objectives, self-contained content, and immediate application opportunities. Ensure each micro-unit provides meaningful learning progress rather than arbitrary content divisions. Design micro-units to function both independently for brief study sessions and collectively for longer sessions when learners have extended time availability.

Eliminate fixed-time synchronous requirements where possible. When synchronous sessions serve pedagogical purposes (real-time discussion, collaborative activities, expert interaction), record and make available asynchronously within 24 hours. Provide rolling deadlines spanning 2-4 weeks for each module, allowing learners to progress at individual pace within broad parameters.

Replace high-stakes midterm and final examinations with frequent low-stakes formative assessments (brief quizzes, reflection prompts, application tasks) maintaining momentum whilst reducing pressure. When summative assessment proves necessary, offer multiple submission windows and flexible formats.

Where examinations remain necessary for quality assurance, provide multiple scheduling options, decentralised locations within reasonable distance of learners' homes, and accommodations for learners with care responsibilities. Consider alternative assessment forms (portfolios, projects, presentations) demonstrating competency without rigid time constraints.

Performance indicators

- Percentage of programme content delivered as micro-units (≤20 minutes): *Target ≥70%*
- Percentage of assessments offering flexible submission windows (≥2 weeks): *Target ≥80%*
- Female module completion rate: *Target ≥65%, approaching male completion rate*
- Gender gap in programme completion: *Target <5 percentage points*
- Learner satisfaction with scheduling flexibility (survey item, 5-point scale): *Target ≥4.0 for women*
- Female retention from enrolment to completion: *Target ≥70%*

Implementation example

Mwansa et al. (2025) document Zambian ODeL programmes that restructured content delivery to accommodate women learners' time constraints, achieving improved participation and completion rates. The programmes divided traditional modules into shorter units, provided asynchronous access to all content, and offered multiple assessment submission windows, resulting in substantially narrowed gender gaps in completion.

Principle 2: Mobile-first and low-bandwidth delivery

Conceptual foundation
Akpan et al. (2024) document that virtual education technology shows substantial disparities in the Global South, with digital divide creating systematic disadvantages. Amjad et al. (2019) establish that women face constraints including lower device ownership, device sharing, data cost barriers, and mediated access. Krönke (2020) argues that addressing Africa's digital divide requires deliberate mobile-first approaches acknowledging these constraints rather than assuming desktop access as standard.

Implementation actions

Prioritise short audio clips (3-8 minutes) enabling engagement whilst performing other tasks, compressed video (≤10mb per video) functioning on low-bandwidth connections, text summaries with simple formatting and clear navigation, and sms-based reminders and support. Test all content on low-end smartphones over 2g/3g connections before deployment.

Provide downloadable content packages updated weekly that learners can access without ongoing data consumption. Design content packages to include complete modules with associated assessments, supporting materials, and multimedia resources. Ensure core learning activities remain fully functional offline, with online connectivity required only for submission of completed work.

Negotiate zero-rating partnerships with mobile network operators making educational content data-free for learners. Where zero-rating proves infeasible, provide data vouchers covering core learning activities. Calculate actual data requirements for programme completion and ensure subsidies cover realistic usage patterns.

Implement sms reminders for approaching deadlines, encouragement messages during difficult periods, and basic support for common technical issues. Design sms systems enabling two-way communication where learners can request help and receive timely responses.

Design content following progressive enhancement principles where core functionality works with minimal technology whilst enhanced features become available when better connectivity or devices exist. Ensure learners with basic feature phones can access essential content via sms or basic web interfaces, whilst smartphone users benefit from multimedia and interactive features.

Performance indicators

- Percentage of content accessible offline: *Target ≥80%*
- Average data cost per learner per module: *Target ≤2% of minimum wage*
- Assignment submission rates via mobile devices (female learners): *Target ≥70%*
- Female learner login frequency: *Target ≥4 sessions per week*
- Learner satisfaction with mobile experience (survey item): *Target ≥4.0 for women*
- Percentage of women learners accessing via zero-rated or subsidised data: *Target 100%*

Implementation example

Oladele et al. (2021) document prospects for online instructional delivery in Sub-Saharan Africa using accessible platforms, noting that mobile-optimised approaches show substantially higher engagement amongst women learners compared to desktop-centric designs. Programmes providing offline content access and data subsidies achieved assignment completion rates exceeding 70% amongst women learners with limited connectivity.

Principle 3: Community-embedded learning

Conceptual foundation

Khaliqi et al. (2024) document that breaking barriers to women's empowerment through online education requires not only individual access but deliberate community support structures. Madlela and Ngakane (2024) describe implementing ODeL in Eswatini teacher training, noting that community-embedded approaches provide social support, external accountability, and normalisation of educational participation whilst addressing isolation inherent in distance learning.

Implementation actions

Identify existing women's groups (cooperatives, savings groups, faith-based organisations), community centres, and local organisations as potential learning hub partners. Build on established infrastructure and trust relationships rather than creating parallel structures.

Recruit and train local facilitators, preferably women from the community with secondary education and respected standing. Provide comprehensive initial training covering basic subject content and learning objectives, technology troubleshooting and learner support, group facilitation and peer learning strategies, gender-sensitive communication and awareness of

women's barriers, motivational interviewing and encouragement techniques, and referral protocols when issues exceed facilitator scope.

Organise monthly face-to-face meetings at community hubs with structured agendas including brief formative assessments and practice tasks, peer teaching where learners explain concepts to each other, study strategy and time management sharing, motivational discussions and barrier problem-solving, and administrative support for technical issues or institutional processes.

Provide mobile connectivity at hub locations enabling learners to download content packages, submit completed assignments, and access online resources during meetings. Equip hubs with basic technology (tablets or low-cost laptops, portable wifi hotspots, charging facilities) supporting learners without personal devices or home connectivity.

Create online discussion forums or messaging groups specifically for women learners, facilitated by trained moderators. Design online spaces enabling candid discussion of barriers, mutual encouragement, and collective problem-solving.

Ensure hub locations are physically accessible and perceived as safe by women learners. Where cultural norms restrict mixed-gender interactions, provide women-only spaces or separate meeting times. Address childcare needs through either providing childcare arrangements or designing child-friendly meeting spaces.

Performance indicators

- Number of active local learning hubs: *Target 1 per 500 female learners enrolled*
- Peer group meeting attendance (female learners): *Target ≥60% attending monthly*
- Retention comparison: hub access vs. no hub access: *Target ≥15 percentage points difference*
- Learner satisfaction with peer support (survey item): *Target ≥4.2 for women*
- Hub operational costs per learner per month: *Target ≤5% of programme tuition*
- Percentage of female learners reporting peer support as valuable: *Target ≥75%*

Implementation example

Madlela and Ngakane (2024) describe implementing ODeL in Eswatini teacher training institutions through community partnerships, achieving improved retention amongst women learners through peer support structures and local facilitation. The approach required modest investment in facilitator training and hub connectivity whilst leveraging existing community infrastructure, demonstrating feasibility for resource-constrained contexts.

Principle 4: Multilingual and multimodal content

Conceptual foundation

Sanfo et al. (2024) establish through rigorous analysis that language of instruction creates substantial learning achievement inequalities, with effects particularly pronounced for learners from linguistic minority backgrounds and those with limited formal schooling, populations disproportionately including women. Materials available only in colonial

languages create disproportionate cognitive load, suggesting multilingual and multimodal approaches as equity imperatives rather than enhancements.

Implementation actions

Translate key course materials into relevant local languages, prioritising module guides and learning objectives, assignment instructions and assessment criteria, audio summaries of core concepts, and frequently asked questions and support materials. Where comprehensive translation proves resource-prohibitive, focus on materials where comprehension proves most critical.

Develop audio narrations for each module using conversational language and culturally resonant examples rather than simply reading written text. Employ local language speakers to record audio content ensuring authentic pronunciation and cultural appropriateness. Design audio content as standalone learning resource enabling engagement whilst performing other tasks.

Create short instructional videos (5-10 minutes) with simple language, clear visuals, and subtitles in multiple languages. Use culturally appropriate imagery and contexts making content relevant to learners' lives. Focus video content on concepts benefiting from visual explanation.

Offer Assessment options including oral submissions via voice recording, video presentations demonstrating competencies, portfolio assessments compiling evidence of learning, and written assignments where appropriate. Ensure alternative modalities maintain academic rigour whilst accommodating diverse literacies and preferences.

Provide scaffolded reading guides for text-heavy content, including glossaries of technical terms, summaries of complex vocabulary, concept maps showing relationships, and guiding questions focusing attention on key information.

Ensure examples, case studies, and scenarios reflect learners' cultural contexts and lived experiences. Avoid examples assuming western middle-class experiences. Engage local content developers and reviewers ensuring cultural appropriateness.

Performance indicators

- Percentage of core content available in primary local languages: *Target ≥60%*
- Percentage of modules with audio alternatives: *Target ≥80%*
- Pass rates for learners using audio/oral assessments vs. text-only: *Target approaching parity*
- Completion rates amongst learners with primary-only education: *Target ≥55%*
- Learner satisfaction with language options (survey item): *Target ≥4.0 for women*
- Usage patterns: percentage of learners regularly using audio content: *Target ≥70% of women*

Implementation example

Abuali and Ahmed (2025)evaluate e-learning's impact on girls' education in Afghanistan, documenting that programmes offering content in local languages with audio alternatives achieved substantially higher completion rates amongst women with limited formal schooling. The multilingual multimodal approach required initial investment in translation and audio production but yielded substantial equity gains justifying the costs.

Monitoring and evaluation framework

Conceptual foundation

Lembuka (2023)documents through literature review that gender equality in online education remains inadequately measured, with most institutions tracking only enrolment by gender. Effective monitoring and evaluation must link design interventions to outcomes through clear results chain, moving from inputs through outputs and outcomes to long-term impacts. The framework prioritises barrier reduction and empowerment outcomes often neglected in conventional ODeL monitoring.

Core indicator framework

Table 1 presents the complete monitoring and evaluation indicator framework organised by results chain level, adapted for resource-constrained contexts with emphasis on feasible data collection methods.

Table 1
Monitoring and Evaluation Indicator Framework

Level	Indicator	Target	Data Source	Collection frequency
Inputs (Resources invested)				
	Budget allocated to gender-responsive measures	≥10% of ODeL budget	Financial records	Annual
	Female tutors/facilitators trained	≥50% of total	Training records	Quarterly
	Staff allocated to gender/inclusion functions	≥1 FTE per institution	HR records	Annual
	Mobile operator partnerships established	≥1 active partnership	Partnership agreements	Annual
Outputs (Features delivered				
	Modules delivered as micro-units	≥70%	Content audit	Semester
	Content accessible offline	≥80%	Technical audit	Semester
	Active local learning hubs	1 per 500 women	Attendance logs	Monthly
	Core content in local languages	≥60%	Content audit	Semester

	Learners receiving data subsidies	100%	Administrative records	Monthly
Outcomes: Engagement				
	Female module completion rate	≥65%	LMS analytics	Monthly
	Gender gap in completion	<5 percentage points	LMS analytics	Monthly
	Average time-on-task (female learners)	≥8 hours/week	LMS analytics	Weekly
	Login frequency (female learners)	≥4 sessions/week	LMS analytics	Weekly
	Assignment submission rate (female)	≥70%	LMS analytics	Per assignment
Outcomes: Barrier reduction				
	Women reporting reduced time barriers	≥50% improvement	SMS surveys	Quarterly
	Women reporting household support	≥60%	SMS surveys	Quarterly
	Women accessing via affordable data	100% zero-rated/subsidised	Technical logs	Monthly
	Women with hub access <20km	≥80%	Geographic mapping	Annual
Outcomes: Empowerment				
	Study confidence (pre-post change)	Significant increase	Entry/exit surveys	Cohort basis
	Agency in household decisions	≥60% high agency	Exit survey	End of programme
	Active in peer networks	≥50% regular participation	Hub logs, forum data	Monthly
Outcomes: Completion				
	Female completion rate overall	≥65%	Administrative records	Cohort completion
	Time-to-completion (female vs. male)	<10% difference	Administrative records	Cohort completion
	Progression to further study	≥30% of completers	Tracer study	6 months post
Impacts: Economic				
	Employment status improvement	≥40% of completers	Tracer study	6, 18 months post
	Income increase attributed to education	≥20% reporting	Tracer study	18 months post
Impacts: Educational				
	Enrolled in further study	≥30%	Tracer study	6, 18 months post
	Engaged in informal learning	≥60%	Tracer study	18 months post
Impacts: Social/Civic				

	Community leadership roles	≥20%	Tracer study	18 months post
	Civic engagement	≥70%	Tracer study	18 months post

Data collection methods

Export data monthly from learning management systems with gender variable included. Analyse for gender gaps in engagement metrics, points where women disproportionately disengage, and changes following design interventions.

Deploy brief surveys (5-10 items, 3-5 minutes) via sms every 4-6 weeks. Include items on time availability, barriers encountered, confidence levels, household support, and satisfaction with features. Use free services like frontline sms or odk collect.

Conduct small focus groups (6-8 participants) with purposive samples twice annually, including women who withdrew, women who persisted, male learners, and tutors/facilitators. Use structured guides ensuring consistent data collection.

Local Facilitators submit brief monthly reports via sms or mobile forms covering attendance, challenges discussed, learners requiring support, and observations on what works.

Contact learners 6- and 18-months post-completion via phone surveys or sms. Assess employment status, further study, knowledge/skills application, community engagement, and self-reported empowerment. Target >60% response rate.

Systematically record enrolment by gender and demographics; withdrawal dates and reasons; module completion rates by gender; assessment performance by gender; and time-to-completion distributions.

Feasibility for resource-constrained contexts

Design monitoring systems using tools already available. Most LMS platforms include basic analytics; if not, simple spreadsheet tracking suffices. SMS surveys via free services require minimal technical capacity. Focus groups and phone surveys require time but minimal financial investment. Prioritise indicators directly informing improvement decisions. Start with simple metrics (completion rates by gender, monthly login frequency, brief barrier surveys) and expand as capacity permits.

Recommendations for policy and practice

Institutional policy recommendations

Mandate gender-disaggregated reporting

Following Lembuka (2023) guidance on measuring gender equality in online education, require comprehensive gender-disaggregated reporting in all programme reviews and annual reports. Include module completion, withdrawal patterns, engagement metrics, and qualitative feedback, not only enrolment and graduation. Make disaggregated data visible to decision-makers.

Establish design standards

Adopt micro-modular design as institutional default for programmes targeting working adults and learners with caregiving responsibilities. Establish mobile-first design standards for all new content. Mandate that all synchronous sessions be recorded and available asynchronously within 24 hours. Prioritise flexible, asynchronous assessment options.

Allocate dedicated resources

Include dedicated budget lines for data subsidies or zero-rating partnerships; local learning hub establishment and maintenance; content translation and multimodal production; and gender-responsive monitoring and evaluation systems. Recognise that gender-responsive design requires investment, not merely goodwill.

Create governance structures

Establish Gender and Inclusion Unit within ODeL governance structures with mandate to review programme designs, analyse disaggregated data, recommend interventions, coordinate professional development, and report annually to leadership on equity outcomes. Ensure authority and resources, not merely advisory status.

Regional and national policy recommendations

Align with regional strategic plans

Implement the Southern African Development Community's (2022) Regional ODL Strategic Plan 2022-2030, which provides framework for equitable ODeL development. National policies should align with regional commitments whilst adapting to local contexts.

Incorporate into quality assurance

Following Ayoko (2024) recommendations for actualising SDG4 through ODeL, national quality assurance bodies should incorporate gender responsiveness into accreditation standards. Institutions seeking accreditation should demonstrate collection and analysis of gender-disaggregated data, evidence of programme design accommodating diverse learner circumstances, monitoring of equity outcomes with improvement plans, and institutional structures supporting gender equity.

Support zero-rating partnerships

Government telecommunications regulators should facilitate negotiations between educational institutions and mobile network operators for zero-rating educational content, addressing Amjad et al. (2019) findings on connectivity as barrier to bridging gender gaps through technology-based distance education.

Promote multilingual education

Following Sanfo et al. (2024) findings on language of instruction inequalities, national language policies should explicitly promote multilingual higher education including ODeL. Provide funding for translation of educational materials into official and widely spoken local languages.

Fund systematic research

Support systematic research on gender-responsive ODeL through national research councils. Fund longitudinal studies, comparative studies, implementation research, and impact evaluations. Disseminate findings through accessible policy briefs.

Capacity building priorities

Instructional designer training

Train instructional designers on micro-modular content design, mobile-first design principles, multimodal content creation, universal design for learning, and gender-responsive pedagogy.

Assessment officer training

Train assessment officers on flexible assessment design, alternative assessment modalities, decentralised assessment administration, digital assessment platforms, and reasonable accommodations whilst maintaining standards.

Local facilitator development

Develop standardised training programmes for community-based facilitators covering subject content, technology troubleshooting, group facilitation, gender-sensitive communication, motivational interviewing, and referral protocols.

Leadership awareness

Provide workshops for institutional leaders on evidence regarding women's barriers and design-responsive solutions, return on investment for gender-responsive interventions, strategic vision for ODeL as inclusive educational model, and accountability mechanisms.

Addressing implementation constraints

Infrastructure investments

Following Ndibalema (2022) documentation of constraints in online learning transition, prioritise infrastructure investments addressing technological inadequacies, connectivity issues, and financial barriers affecting women learners disproportionately.

Sector-specific adaptations

Following Isangula et al. (2021) recognition of sector-specific challenges in nursing and midwifery education, ensure gender-responsive design accounts for discipline-specific requirements including practical skill development and professional regulation.

Context-appropriate solutions

Following Abuali and Ahmed (2025) analysis of e-learning in Afghanistan and Hakimi et al. (2024) examination of challenges in developing countries, recognise that whilst principles apply broadly, specific solutions must adapt to local cultural, political, and infrastructural contexts.

Conclusion

This integrative review identifies persistent gender gaps in ODeL participation and completion across Sub-Saharan Africa and South Asia, stemming not from women's capabilities but from institutional designs that systematically exclude learners with caregiving responsibilities, limited digital access, mobility constraints, and diverse linguistic backgrounds. Three main barriers emerge: time poverty from unpaid care work (women spend 3-5 hours more daily than men), gendered digital access constraints (lower device ownership, data costs, mediated access), and inadequate linguistic accommodation (colonial language instruction disadvantaging rural women with interrupted schooling).

Four evidence-based design levers effectively address these barriers: (1) micro-modular content enabling 10-20 minute study sessions improves completion by 18-35 percentage points; (2) mobile-first design with offline access increases engagement among women with limited connectivity; (3) community learning hubs reduce dropout through peer support and accountability; (4) multilingual multimodal content lowers cognitive load for women with limited formal schooling. The Gender-Responsive ODeL Design and Evaluation Toolkit translates these findings into 32 specific implementation actions and 40 monitoring indicators, enabling practitioners to move from barrier documentation to systematic intervention within resource constraints.

The toolkit changes practice by providing actionable guidance where institutions currently lack clear frameworks, shifting monitoring from access-only metrics to engagement, barrier reduction, and empowerment outcomes, and offering minimum viable indicator sets feasible for resource-constrained contexts. Implementation requires political will, sustained resource allocation, institutional culture change, and accountability mechanisms tracking gender-disaggregated outcomes.

Future research should examine: (1) longitudinal studies measuring sustained empowerment outcomes beyond programme completion; (2) comparative effectiveness trials testing specific design features across contexts; (3) implementation research documenting facilitators and barriers to institutional adoption; (4) cost-effectiveness analyses informing resource allocation decisions; (5) sector-specific adaptations addressing discipline-based constraints in fields like health professions education. With evidence-based design and systematic monitoring, ODeL can fulfil its transformative potential for advancing women's educational opportunities across developing regions.

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