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Micro-credentials as a solution for rapid skill acquisition and workforce flexibility

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Abstract

Rapid changes in global labour markets have increasingly challenged the capacity of traditional education systems to respond promptly to emerging skill needs. This study explores the potential of micro-credentials as a flexible approach to skill development and workforce adaptability in Uganda. Using a mixed-methods design, data were collected from 150 learners and 20 employers through surveys and semi-structured interviews, complemented by document analysis of selected university initiatives. The findings suggest that micro-credentials support the acquisition of specific, job-relevant skills, particularly in digital, technical, and entrepreneurial areas. Many learners reported applying newly acquired skills within a few months of completion and perceived micro-credentials as contributing to improved employability and career mobility. Employers generally acknowledged the practical relevance of technical micro-credentials, while expressing reservations about programmes lacking accreditation or clear quality assurance. Institutional analysis indicated that micro-credentials are only partially embedded within formal degree pathways, and the absence of national standards may limit their broader recognition and scalability. Drawing on Human Capital Theory and the Lifelong Learning Framework, the study highlights the potential of micro-credentials to complement existing education and training systems. The paper concludes by emphasising the importance of policy coordination, employer involvement, and national frameworks to strengthen the role of micro-credentials in Uganda and similar Sub-Saharan African contexts.

Keywords Micro-credentials, Skill development, Employability, Higher education, Lifelong learning, Short courses

1 Introduction

The accelerating pace of technological advancement, globalisation, and automation has transformed labour markets worldwide, intensifying the demand for continuous and agile skill acquisition [21, 22, 27]. Traditional degree programs, while still vital for foundational education, often lack the flexibility, responsiveness, and modularity required to meet rapidly evolving workplace demands [11, 25, 28]. As a result, both individuals and employers are seeking alternative learning pathways that offer more targeted, time-efficient, and accessible forms of education.



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Micro-credentials, short, competency-based certifications focused on specific skills or knowledge areas [10], have emerged as a promising solution to this challenge. Offered by universities, professional bodies, and online platforms, micro-credentials allow learners to upskill or reskill at their own pace and in alignment with current industry needs. Their stackable, modular, and often digital nature makes them especially suitable for addressing workforce flexibility, career mobility, and lifelong learning imperatives.

Globally, micro-credentials are gaining traction across higher education institutions and industries [2, 6, 16]. However, in developing countries such as Uganda, where formal education systems are often overstretched and unemployment remains high, particularly among youth, the potential of micro-credentials is both significant and underexplored. While early adopters have begun to implement micro-credential programs, there is still limited empirical evidence on their effectiveness, employability outcomes, and institutional integration in such contexts. This study seeks to address this gap through the following research objectives:

To examine the effectiveness of micro-credentials in promoting rapid skill acquisition among learners in Uganda.

To investigate how micro-credentials contribute to workforce flexibility and employability, particularly in sectors impacted by digital transformation.

To identify institutional and structural challenges in the implementation and recognition of micro-credentials in higher education and industry settings.

To achieve these objectives, the study is guided by the following central research question:

To what extent do micro-credentials support rapid skill acquisition and enhance workforce flexibility in a rapidly changing labour market, particularly within the Ugandan context?

2 Literature review

Micro-credentials have gained global attention as higher education systems and labour markets face increasing pressure to produce agile, work-ready graduates in the context of rapid technological change, automation, and digitalisation. International bodies such as UNESCO [26], OECD [15], and the European Commission [7] identify micro-credentials as a key mechanism for widening access to flexible learning and addressing persistent skills mismatches. At their core, micro-credentials offer short, targeted, and competency-based learning designed to support rapid upskilling or reskilling, particularly in sectors experiencing fast-paced transformation such as ICT, data science, digital entrepreneurship, and project management [34, 35]. Their modular and often stackable nature aligns with contemporary models of lifelong learning and skills-based hiring.

2.1 Rapid skill acquisition and learning effectiveness

A growing body of work suggests that micro-credentials are particularly effective for accelerating skill acquisition. Keeley, [10] characterises them as focused, flexible learning units designed to meet immediate skill needs, while Charles and Hill [3] emphasise their alignment with just-in-time learning principles. Empirical studies across Europe and Asia indicate that micro-credentials support faster learning cycles compared to traditional qualifications because they concentrate on discrete competencies, integrate industry input, and utilise digital delivery modes [15]. In lower-income contexts, the demand

for rapid, affordable, and accessible learning is even more pronounced. Research in African settings shows that micro-credentials can help overcome barriers associated with cost, geographic distance, and limited higher education capacity [13, 30]. These findings resonate with broader scholarship on human capital development, which argues that short-cycle, targeted training can yield significant productivity gains when aligned with labour market needs (McGuinness et al. 2018).

2.2 Workforce flexibility, employability, and skills portability

Micro-credentials are increasingly positioned as tools for enhancing workforce flexibility, enabling individuals to transition across roles, update outdated skills, or enter emerging fields. Surono and Jusuf, [23] describe them as foundational components of “future-ready skills systems,” while the lifelong learning paradigm emphasises iterative skill accumulation across the lifespan [7]. Studies in South Africa and Kenya demonstrate that micro-credentials in digital skills and entrepreneurship have expanded employability options, including freelance and gig-economy work, particularly among youth [13]. Similar patterns emerge in Uganda, where micro-credential graduates increasingly target roles in ICT support, digital marketing, and e-commerce. However, the literature also foregrounds ongoing tensions: although micro-credentials can enhance employability, their impact is highly dependent on employer awareness, labour market alignment, and credential transparency. Skills portability remains uneven, especially across African labour markets that lack harmonised recognition systems [9].

2.3 Employer recognition and credibility concerns

One of the most contested debates concerns the extent to which employers trust and recognise micro-credentials. Cheng et al. [5] note that employer acceptance is inconsistent and heavily influenced by the issuing institution’s credibility, the perceived rigour of assessments, and alignment with industry-defined competencies. Oliver [34] similarly warns that without clear quality benchmarks, micro-credentials risk being viewed as inferior or fragmented alternatives to formal qualifications. Emerging evidence shows that employer trust increases significantly when micro-credentials are issued by accredited universities, include demonstrable evidence of competence (e.g., portfolios, capstone projects), and are co-designed with industry partners [8, 26]. In low- and middle-income countries, however, employer awareness remains limited. Ugandan employers frequently express uncertainty about the authenticity, comparability, and labour market value of micro-credentials, especially those from foreign platforms or non-accredited providers. This challenge underscores the broader global concern that micro-credentials may widen, rather than bridge, inequalities if their recognition is stratified.

2.4 Institutional integration, policy gaps, and systems-level challenges

Despite their promise, the integration of micro-credentials into higher education systems remains uneven. Varadarajan et al. [29] argue that institutions must reconfigure curriculum structures, quality assurance mechanisms, and governance frameworks to meaningfully incorporate micro-credentials. Many universities struggle to align micro-credentials with existing credit systems, accreditation procedures, and faculty workloads, leading to fragmented or peripheral adoption. Many universities struggle to align micro-credentials with existing credit systems, accreditation procedures, and faculty

workload models, often resulting in fragmented or peripheral adoption within higher education institutions [15, 26]. In response to these challenges, governments have begun to develop national and regional policy frameworks to standardise quality assurance, portability, and stackability. A prominent example is the European Commission's European Approach to Micro-credentials, which establishes common standards for transparency, recognition, and integration into formal qualification systems [7]. However, in Sub-Saharan Africa, policy development is slow. Studies by Ghasia et al. [9] and Omona and Mbabazi [17] highlight the limited digital infrastructure, absence of national credentialing frameworks, and reliance on donor-funded pilots as major obstacles. Uganda exemplifies this trend: while interest in micro-credentials is rising, the country lacks standardised national guidelines, interoperable digital credential systems, or credit transfer policies to support widespread institutional adoption.

2.5 Synthesis and identified gaps

Across the existing literature, several converging patterns can be observed regarding the role and limitations of micro-credentials. Research consistently highlights their strong potential for rapid skill acquisition, particularly in digital and technical domains where labour market demands evolve most quickly. Studies also indicate that micro-credentials contribute to workforce flexibility by enabling learners to update skills, shift roles, or access new occupational pathways; however, the extent of this impact varies significantly across sectors and national contexts. A recurrent challenge that emerges across multiple studies is the limited recognition of micro-credentials by employers, largely shaped by concerns around quality assurance, transparency, and the perceived legitimacy of issuing institutions. These recognition challenges intersect with broader systemic issues, notably the absence of robust policy frameworks and standardised credentialing systems, which remain underdeveloped in many African countries. Despite increasing global attention, African-centred empirical research on micro-credentials is still sparse, with most studies relying on perceptions rather than longitudinal evidence of impact. Moreover, employer perspectives are generally underrepresented, and little is known about cross-country credential portability within African labour markets. This study responds directly to these gaps by offering mixed-methods evidence from Uganda, drawing on insights from both learners and employers to provide a grounded and contextually relevant understanding of how micro-credentials shape skill development and workforce adaptability.

2.6 Theoretical framework

This study is grounded in two complementary theoretical perspectives: Human Capital Theory and the Lifelong Learning Framework. These frameworks provide the conceptual basis for understanding how micro-credentials contribute to skill acquisition, employability, and workforce adaptability in a rapidly evolving labour market.

Human Capital Theory, developed by Gary Becker [19], posits that individuals and societies benefit from investments in education and training, as these improve workers' productivity, leading to higher earnings and economic growth. Education is viewed as a form of capital, akin to physical or financial capital, that enhances individual capabilities and contributes to broader economic development. By applying Human Capital Theory, this study examines whether micro-credentials produce measurable returns in terms

of employability, skill development, and workforce agility, particularly in the Ugandan labour market.

The Lifelong Learning Framework [12] promotes the idea that learning should occur throughout an individual's life and across multiple contexts, formal, non-formal, and informal. This framework is endorsed by international bodies such as the European Commission and UNESCO, which advocate for flexible, learner-centred pathways that support personal development, active citizenship, and workforce adaptability. Through this lens, the study explores how micro-credentials are not only a tool for individual upskilling but also a systemic mechanism to support national strategies for workforce development and inclusive learning.

Together, Human Capital Theory and the Lifelong Learning Framework offer a robust conceptual foundation for this research. These theories collectively guide the research in examining how micro-credentials are perceived, utilised, and integrated within both individual career trajectories and broader educational or employment systems in Uganda.

3 Methodology

This study adopted a mixed-methods research design, integrating quantitative and qualitative approaches to develop a comprehensive understanding of the role of micro-credentials in supporting rapid skill acquisition and workforce flexibility in Uganda. A mixed-methods approach was appropriate because it allowed the collection of both measurable trends and in-depth experiential insights, enabling triangulation across datasets and thereby enhancing the overall validity and reliability of the findings [1, 14, 20]. The study was conducted exclusively in Uganda to provide a contextually grounded analysis relevant to a developing economy where micro-credential adoption is still emerging.

3.1 Population and sample

The study targeted three primary groups whose experiences and perspectives were essential for understanding the role of micro-credentials in skill development and workforce flexibility in Uganda. These included (a) learners who had completed at least one micro-credential through a university, professional body, or digital learning platform such as Coursera and edX; (b) employers, particularly human resource managers, talent acquisition officers, and training coordinators drawn from different sectors; and (c) educators and institutional administrators involved in designing, delivering, or managing micro-credential programmes. Focusing on these groups ensured that the study captured viewpoints across the entire micro-credential ecosystem, from learning and uptake to utilisation and labour market relevance.

Purposive sampling was employed to select participants who possessed direct, relevant experience with micro-credentials. This sampling method was chosen to ensure that only individuals with meaningful engagement in micro-credential learning, implementation, or evaluation were included in the study [1, 24]. Learners were recruited through institutional mailing lists, university continuing education units, digital learning support centres, and professional training programmes. Employers were contacted through industry associations, university–industry partnership offices, LinkedIn professional groups, and human resource networks. Educators and administrators were

identified through university directorates responsible for short courses, digital learning, and curriculum development.

Inclusion criteria for learners required that participants had completed at least one micro-credential in the past three years and were willing to share their experiences. Employers were included if they were involved in recruitment, training, or performance assessment within their organisations. Educators were included if they had participated in designing or overseeing micro-credential delivery. Individuals without such experience were excluded to maintain the relevance and depth of the data. Out of the 210 learners contacted, 150 completed the survey, representing a response rate of 71.4 per cent. For employers, 38 organisations were approached and 20 agreed to participate, yielding a response rate of 52.6 per cent. Although the employer sample was relatively small, efforts were made to ensure diversity across sector, firm size, and type of work to maximise the representativeness of qualitative insights.

Among participating employers, 15 were drawn from the private sector including ICT firms, telecommunications companies, financial institutions, and medium-sized enterprises, while five represented the public sector, mainly in education, local government, and public health. Firm size varied from small enterprises (fewer than 50 employees) to large organisations (over 500 employees), providing a wider lens through which to understand employer perspectives on micro-credential recognition. All participants were based in Uganda and were engaged in industries or educational institutions where digitalisation and workforce upskilling are ongoing priorities. The demographic characteristics of the participants are presented in Table 1.

3.2 Data collection methods

3.2.1 Surveys (quantitative)

Structured online and paper-based surveys were administered to learners to assess perceived effectiveness of micro-credentials in skill development, career outcomes or employment changes after earning micro-credentials, and satisfaction levels and perceived relevance to industry demands. The survey contained both Likert-scale items and open-ended questions for elaboration.

3.2.2 Semi-structured interviews (qualitative)

Semi-structured interviews were conducted with 15 learners, 10 educators, and 20 employers. Interviews were conducted either face-to-face or via video conferencing, depending on participant availability. Key interview questions include:

How would you describe your experience with micro-credentials?

What motivated you (or your employees) to pursue micro-credentials?

In your view, how relevant are micro-credentials to current job requirements?

How do you (as an employer) evaluate candidates with micro-credentials compared to traditional degrees?

What challenges have you faced in adopting or recognising micro-credentials?

What recommendations do you have for improving micro-credential systems in Uganda?

Questions were aligned with the research objectives and literature gaps. They were pilot tested with a small subset of participants ($n=5$) to ensure clarity and relevance. Adjustments were made based on pilot feedback to improve flow and reduce ambiguity.

Table 1 Demographic characteristics of participants**A. Learners (n = 150)**

Category	Sub-category	Frequency (n)	Per-centage (%)
Gender	Male	87	58
	Female	63	42
Age range	18–24 years	21	14
	25–34 years	105	70
	35 years and above	24	16
Employment status	Employed full-time	78	52
	Employed part-time	12	8
	Self-employed	30	20
	Seeking employment	30	20
Highest education level	Diploma	39	26
	Bachelor's degree	84	56
	Postgraduate (Masters/PGD)	27	18
Platform used for micro-credentials	Coursera	60	40
	University-offered micro-credentials	53	35
	Local/employer-sponsored short courses	37	25
Field of micro-credential study	ICT & digital skills	72	48
	Business & entrepreneurship	33	22
	Project management	21	14
	Other technical/vocational areas	24	16

B. Employers (n = 20)

Category	Sub-category	Frequency (n)	Per-centage (%)
Sector	Private sector	15	75
	Public sector	5	25
Industry type	ICT/Telecommunications	6	30
	Banking & Financial Services	4	20
	Manufacturing	3	15
	Education & Training	3	15
	NGOs/Development Sector	4	20
	Small (1–49 employees)	5	25
Firm size (number of employees)	Medium (50–249 employees)	8	40
	Large (250 + employees)	7	35
Position of Respondent	HR Manager/Talent Manager	9	45
	Training & Development Officer	6	30
	Line Manager/Supervisor	5	25
Engagement with micro-credentials	Uses micro-credentials for staff upskilling	11	55
	Has hired applicants with micro-credentials	8	40
	No direct experience but aware of them	1	5

3.2.3 Document analysis

Institutional policy documents and strategic plans related to micro-credential implementation in Ugandan universities and training institutions were reviewed to assess integration strategies and quality assurance mechanisms.

3.3 Data analysis

3.3.1 Quantitative data analysis

Quantitative data from the learner surveys were analysed using SPSS 31. Descriptive statistics, including frequencies, means, and standard deviations, were employed to summarise patterns in learners' micro-credential experiences, skill acquisition outcomes, and employability perceptions. Inferential analyses were conducted to examine the relationship between participation in micro-credential programmes and perceived improvements in employability. Specifically, Pearson correlation and multiple regression analyses were used to determine the extent to which micro-credential engagement predicted changes in job readiness, confidence, and interview prospects. Prior to analysis, data were screened for missing values, outliers, and normality to ensure adherence to statistical assumptions. Reliability analysis (Cronbach's alpha) confirmed acceptable internal consistency for the survey scales.

3.3.2 Qualitative data analysis

Qualitative data from semi-structured interviews were analysed using NVivo 15, following a rigorous thematic analysis process. The study adopted a hybrid coding strategy that integrated deductive and inductive approaches. Deductive codes were drawn from the research questions, theoretical framework, and prior literature, while inductive codes emerged organically from participant narratives. To ensure analytical rigour, the coding process followed several structured steps:

1. Familiarisation: Interview transcripts were read repeatedly to ensure deep engagement with the data and to identify preliminary ideas.
2. Initial Coding: Line-by-line coding was conducted, assigning labels to significant statements. Codes captured both manifest content (e.g., "assessment workload," "digital access barriers") and latent meanings (e.g., "credential legitimacy concerns," "institutional misalignment").
3. Inter-Coder Reliability Check: A second researcher independently coded 20% of the transcripts. Cohen's Kappa was calculated to assess coding agreement, resulting in a coefficient of 0.82, indicating a high level of reliability. Discrepancies were discussed and resolved through consensus, leading to refinement of the codebook.
4. Codebook Development: The codebook was iteratively developed, including code definitions, inclusion and exclusion criteria, and example excerpts. This ensured consistency in the application of codes across transcripts.

Following the coding phase, codes were grouped into conceptual categories and subsequently synthesised into overarching themes. The development of themes adhered to Braun and Clarke's (2019) iterative process of reviewing, refining, and validating thematic structures. Themes were evaluated based on internal coherence, distinctiveness from other themes, and their ability to address the research objectives.

To enhance credibility and trustworthiness member checks were conducted with selected participants to verify the accuracy of interpretations and ensure that themes reflected their perspectives, peer debriefing sessions with two qualitative research experts were held to test the robustness of the thematic structure, and negative case analysis was carried out to identify and integrate divergent or contradictory views. Opposing perspectives such as employers who preferred traditional degrees over

micro-credentials, or learners who found micro-credentials insufficiently rigorous, were incorporated to avoid thematic bias.

3.4 Ethical considerations

Ethical approval was obtained from Kampala International University Research and Ethics Committee. Written informed consent was secured from all participants before data collection. Participants were assured of confidentiality and the right to withdraw at any time without consequence. All data were anonymised and securely stored in encrypted digital formats.

3.5 Limitations of the methodology

This study is subject to several methodological limitations that should be considered when interpreting the findings. First, the research was conducted exclusively within Uganda, a lower-income context with distinct educational structures, labour market conditions, and digital infrastructure. As such, the transferability of the findings to other Sub-Saharan African countries or global contexts may be limited. While the study offers valuable insights into micro-credential adoption in a developing economy, broader regional comparisons would strengthen external validity.

Second, the reliance on purposive sampling introduces potential sampling bias. Participants were selected based on their direct involvement with micro-credentials, which ensured relevant expertise but may also have resulted in an overrepresentation of individuals who were already motivated, digitally literate, or positively inclined toward alternative learning pathways. Learners who struggle with access, affordability, or digital readiness may be underrepresented, thereby influencing the perceived benefits and challenges presented in the findings.

Third, the study relied heavily on self-reported data, particularly regarding skill gains, employability outcomes, and workplace flexibility. Self-reported measures are susceptible to various biases, including recall errors and social desirability bias, where participants may overstate improvements or downplay challenges. The absence of objective outcome measures—such as verified employment records, skills assessments, or employer performance evaluations—limits the ability to draw definitive conclusions about the actual impact of micro-credentials on labour market outcomes.

Fourth, although employer perspectives were included, the employer sample size ($n=20$) was relatively small and not fully representative of Uganda's diverse labour market. The sample was drawn primarily from firms with existing engagement in training or digital skills development, which may not reflect broader employer attitudes, especially among small enterprises, rural businesses, or organisations unfamiliar with micro-credentials. The limited number of employers also restricted the depth of comparative analysis across sectors, firm sizes, and industry types.

Finally, the qualitative component, while rich in insight, faced typical limitations associated with interview-based research. Despite procedures such as member checking and peer debriefing, qualitative findings remain influenced by researcher interpretation and the contextual dynamics of interviews. A larger qualitative sample and multi-phase data collection could further enhance the robustness of emergent themes.

Overall, these limitations do not undermine the value of the study but highlight areas where caution is warranted and where future research should aim to incorporate more

Table 2 Descriptive statistics on perceived effectiveness of micro-credentials ($n = 150$ learners)

Theme	Indicator	Percentage (%)
Rapid skill acquisition	Agreed they gained new skills faster than traditional programs	81
	Applied new skills within 3 months of completion	76
Career relevance	Content highly aligned with current job requirements	68
	Attributed micro-credentials to gaining a new role or promotion	54
Employability outcomes	Reported positive change in employment status post-completion	49
	Increased job interview opportunities	62

Table 3 Regression analysis between number of micro-credentials completed and perceived employability ($n = 150$)

Variable	B	SE B	β	T	p-value	R
Number of micro-credentials completed	0.48	0.07	0.62	6.86	< 0.01	0.62
Constant	2.10	0.25	—	8.40	< 0.001	—

Model Summary: $R^2 = 0.38$, Adjusted $R^2 = 0.37$, $F(1,148) = 47.04$, $p < 0.01$

diverse samples, objective outcome measures, and cross-country comparative designs to strengthen evidence on the impact of micro-credentials in dynamic labour markets.

4 Results

This section reports the quantitative and qualitative findings derived from 150 learner surveys and 20 employer interviews conducted across Ugandan higher education institutions, training centres, and industry workplaces. Quantitative data were analysed using SPSS 31, while qualitative data were thematically examined in NVivo 15. The results are presented in an integrated manner to align with the study's research objectives.

4.1 Quantitative findings

4.1.1 Perceived effectiveness of micro-credentials

Descriptive analysis shows that learners held generally positive perceptions of the effectiveness and relevance of micro-credentials. As summarised in Table 2, a majority (81%) agreed that micro-credentials enabled faster skill acquisition than traditional academic programmes, while 76% reported applying newly acquired skills within three months of completion. A further 68% believed that the content aligned closely with current job requirements, and 54% attributed a new role or promotion partly to completing a micro-credential. Although these findings reflect positive perceptions, they are based on self-reported outcomes rather than objectively verified employment transitions.

To examine the association between micro-credential participation and perceived employability, a simple linear regression was conducted with *perceived employability score* as the dependent variable. The regression analysis between number of micro-credentials completed and perceived employability is presented in Table 3. The perceived employability scale (Cronbach's $\alpha = 0.81$) demonstrated acceptable internal consistency. The number of micro-credentials completed was entered as the predictor variable. Because the model contained a single predictor, the value $r = 0.62$ reflects the zero-order Pearson correlation, while $\beta = 0.62$ represents the standardised regression coefficient. The model was statistically significant, $F(1,148) = 47.04$, $p < 0.01$, and explained 38% of the variance in perceived employability (Adjusted $R^2 = 0.37$). Confidence intervals and model diagnostics are presented below. The predictor variable contributed positively to perceived employability ($B = 0.48$, $SE = 0.07$, 95% CI [0.34, 0.62]). Residual analyses

indicated no major violations of homoscedasticity or normality assumptions, although the model should be interpreted cautiously due to the absence of socio-demographic controls such as age, gender, field of training, or employment sector. Importantly, the analysis does not imply causation, as both skill development and employability perceptions may be influenced by other unmeasured variables.

4.2 Qualitative findings

4.2.1 *Micro-credentials as tools for rapid, targeted learning*

Qualitative responses corroborated survey findings, with learners emphasising the practical, modular, and immediately applicable nature of micro-credentials. Participants reported that the focused scope of micro-credentials aligned well with workplace tasks, especially in digital skills, project management, and ICT functions. As one learner explained, *“I needed a specific skill in data visualisation, not another degree. The micro-credential gave me exactly that—quickly.”* These accounts, while subjective, illustrate the perceived efficiency of micro-credential learning pathways.

4.3 Workforce flexibility and career mobility

Employers described micro-credentials as valuable tools for facilitating staff agility, particularly during technological updates or operational changes. Respondents from IT, finance, and education sectors reported internally deploying micro-credentials to reskill employees. Several learners also described transitioning to freelance or remote work after accumulating multiple micro-credentials, suggesting perceived mobility advantages in digital labour markets. However, these accounts reflect personal assessments rather than verified employment outcomes.

4.4 Employer perceptions: selective and conditional recognition

Employers expressed mixed views concerning the legitimacy and workforce value of micro-credentials. Recognition tended to be stronger for micro-credentials issued by known universities or international platforms, particularly in areas requiring technical proficiency (e.g., data analytics, cybersecurity). Conversely, micro-credentials in soft skills or unfamiliar platforms were often viewed with scepticism. One HR officer noted, *“We trust credentials linked to established institutions. Anything from an unknown platform raises questions.”* These findings align with concerns about quality assurance raised in international literature.

4.5 Challenges in implementation and system integration

Educators and administrators highlighted structural constraints, including a lack of national policy guidance, limited employer awareness, and inconsistent quality standards across providers. The absence of credit transfer frameworks has made it difficult to integrate micro-credentials into existing degree structures. As one university administrator noted, *“We do not yet have a formal policy on how micro-credentials articulate into our academic system.”*

4.6 Document analysis

Institutional document reviews from three universities revealed that micro-credential initiatives remain fragmented and largely donor-driven. None of the institutions

Table 4 Summary of key findings

Objective	Summary of findings
Effectiveness in skill acquisition	81% of learners reported rapid and relevant skill acquisition
Contribution to employability and flexibility	49% reported job advancement; employers saw value in adaptability
Challenges and best practices	Lack of standardization and limited employer awareness were major barriers
Employer perceptions	Mixed views; credibility linked to issuing body and skill type

had formalised credit recognition policies, and most offerings were confined to digital literacy, entrepreneurship, and foundational soft skills. These findings triangulate reports from educators and administrators regarding systemic gaps in accreditation and standardisation.

4.7 Integrated interpretation of quantitative and qualitative findings

While quantitative results showed a positive association between the number of micro-credentials completed and perceived employability, qualitative findings contextualised these perceptions by highlighting sector-specific acceptance, practical relevance, and personal career experiences. Nonetheless, both data sources relied heavily on subjective self-reporting, and the study did not incorporate objective employment measures (e.g., verified promotions, salary data, employer-validated performance improvements). As such, findings should be understood as perceptions of impact rather than direct evidence of labour-market outcomes. A summary of the key findings is presented in Table 4.

5 Discussion

This study examined the effectiveness of micro-credentials in facilitating rapid skill acquisition and workforce flexibility in Uganda. The findings indicate that micro-credentials serve as a practical mechanism for addressing urgent skill gaps in a context characterised by high youth unemployment and limited access to formal higher education [13, 30]. Learners consistently reported that micro-credentials enabled targeted, job-relevant learning within condensed timeframes. Unlike traditional degree programs, which often involve extended periods of study and broad theoretical content, micro-credentials provided modular, competency-based learning that learners could immediately apply in professional contexts [3, 10]. The quantitative survey data support this assertion, with 81% of learners agreeing that micro-credentials accelerated skill acquisition and 76% reporting practical application of acquired skills within three months of completion. These findings reinforce Human Capital Theory, highlighting that short-cycle, targeted education can yield measurable returns in individual productivity, particularly when aligned with labour market needs (Becker, 1993; [12]).

Beyond individual skill gains, micro-credentials were associated with enhanced workforce flexibility and career mobility. Both learners and employers noted that these credentials enabled role transitions, internal promotions, and access to freelance or remote work opportunities, particularly in IT, digital marketing, and project management [8, 23]. From a Lifelong Learning Framework perspective, these outcomes demonstrate the potential of micro-credentials to support continuous, modular learning across the career lifecycle [7, 12]. Notably, in the Ugandan context, micro-credentials function not merely as supplementary credentials but as primary avenues for skill acquisition among underemployed youth and informal sector workers [17]. This contrasts with patterns in

high-income countries, where micro-credentials often complement traditional degrees [34]. The study thus provides context-specific evidence that micro-credentials can democratise access to market-relevant skills, bridging gaps in traditional education provision.

Employer perspectives revealed a nuanced understanding of micro-credentials. Technical credentials particularly those linked to recognised institutions or involving practical assessments, were valued and perceived as credible indicators of competence [26, 29]. Conversely, credentials from unfamiliar platforms, particularly soft-skills oriented courses, were met with scepticism [5]. This reflects the interplay between Human Capital Theory and institutional trust: employers acknowledge potential productivity gains but remain cautious in the absence of formal standardisation or regulatory endorsement [4]. The findings underscore the critical role of national frameworks, institutional validation, and industry-academia collaboration in enhancing the legitimacy and perceived value of micro-credentials [9]. Importantly, the study provides one of the first empirical insights into employer perceptions in Uganda, revealing both opportunities and systemic constraints for integrating micro-credentials into workforce development strategies.

Institutional challenges further shape the efficacy of micro-credentials. Educators highlighted the absence of clear accreditation pathways, limited faculty capacity, and lack of integration into formal degree programs as barriers to scalability [5, 29]. These structural limitations resonate with international findings but take on particular urgency in Uganda, where higher education institutions face resource constraints and limited digital infrastructure [18]. From a Lifelong Learning perspective, this suggests that micro-credentials alone are insufficient to transform learning ecosystems; they require complementary policy, governance, and capacity-building measures to enable sustainable impact [7, 12]. Document analysis corroborated these observations, showing that most initiatives remain pilot-oriented, donor-funded, and isolated from formal credit systems, thereby limiting portability and recognition [17].

A key analytical insight from this study is the complementarity of quantitative and qualitative evidence. While survey data indicated statistically significant associations between micro-credential completion and perceived employability ($r = 0.62$), qualitative interviews provided nuanced understanding of the mechanisms behind these perceptions, including skill relevance, adaptability, and employer recognition [3, 10]. The mixed-methods approach thus highlights that the value of micro-credentials is not only in measurable skill gains but also in their capacity to enhance confidence, career agency, and labour market responsiveness. Importantly, the study cautions against over-reliance on self-reported outcomes, advocating for future research that incorporates objective employment metrics and longitudinal tracking to validate perceived benefits [8].

The findings carry both theoretical and practical implications. Theoretically, the study extends Human Capital Theory by demonstrating that skill investments need not be long-term or formal to yield labour market returns; micro-credentials represent an agile, targeted form of human capital accumulation (Becker, 1993; [19]). Simultaneously, the study enriches the Lifelong Learning Framework by showing how modular learning pathways can support career mobility in resource-constrained contexts, highlighting the potential for policy interventions to embed flexible learning at scale [7, 12]. Practically, the study points to the urgent need for Ugandan policymakers and educational institutions to develop national standards, quality assurance mechanisms, and credit

recognition policies to maximise the impact of micro-credentials on employability and economic development [9, 17].

In sum, this study advances the literature by moving beyond descriptive accounts to provide empirical, context-specific evidence of how micro-credentials function in a Sub-Saharan African setting. The results demonstrate that micro-credentials are effective tools for rapid skill acquisition, workforce flexibility, and career mobility, particularly when supported by institutional recognition and aligned with labour market needs. At the same time, the findings highlight persistent challenges—employer scepticism, limited policy frameworks, and structural constraints, that must be addressed to fully realise their transformative potential. By integrating quantitative trends with qualitative insights, this study offers a theoretically grounded, practically relevant understanding of micro-credentials as instruments of agile, inclusive workforce development in low-resource contexts [13].

5.1 Implications for practice and policy

The findings of this study offer several actionable implications for educational institutions, employers, and policymakers seeking to leverage micro-credentials for workforce development in Uganda.

5.1.1 Implications for practice

1. Embedding Micro-Credentials in Higher Education and Training Programs.

Universities and vocational institutions should integrate micro-credentials as stackable or elective components within formal programs. The study found that learners valued micro-credentials for providing targeted, immediately applicable skills, particularly in technical and digital fields. Embedding these credentials into degree pathways can enhance the flexibility and relevance of higher education while maintaining alignment with labour market needs. Institutions should also ensure that faculty are trained to design, deliver, and assess micro-credential courses to maintain quality and credibility [17, 29].

2. Strengthening Industry Collaboration.

The research highlighted that employer recognition is a critical determinant of the perceived value of micro-credentials. Courses co-designed with industry partners, particularly those including practical assessments or project-based learning, were more likely to be acknowledged by employers. Academic institutions should establish ongoing partnerships with private and public sector stakeholders to co-create content that reflects current skills demands, ensuring micro-credentials are directly linked to employability outcomes [3, 8].

3. Enhancing Learner Support and Guidance.

Learners in this study reported uncertainty about which micro-credentials would have meaningful labour market impact. Institutions and training platforms should provide clear guidance on how different micro-credentials map to career paths, potential roles, and stackable qualifications. Advisory services, career counselling, and mentorship can help learners strategically select micro-credentials that maximise their employability and skill development [10, 13].

4. Leveraging Digital Platforms for Accessibility.

Digital delivery emerged as a major enabler of rapid skill acquisition, particularly for learners who cannot access traditional classroom programs. Institutions should invest in robust online learning infrastructure, including user-friendly platforms, mobile access, and support services, to ensure broad participation and engagement. Hybrid approaches combining online and practical components can also enhance learning outcomes, especially in technical skills [7, 30].

5.1.2 Implications for policy

1. **Establishing a National Micro-Credential Framework.**
The study found that lack of standardisation and accreditation reduces employer confidence in micro-credentials. The Ugandan government, through the Ministry of Education and NCHE, should develop a national framework that sets quality standards, defines accreditation processes, and facilitates credit transfer and stackability. Such a framework would enhance portability, recognition, and trust in micro-credentials across sectors and institutions [9, 29].
2. **Integrating Micro-Credentials into National Skills and Development Plans.**
Micro-credentials should be explicitly included in national skills development strategies, such as Uganda Vision 2040 and the National Employment Policy. Aligning micro-credential initiatives with national labour market priorities can ensure they target critical skills shortages, particularly in digital technology, entrepreneurship, and vocational sectors [17].
3. **Incentivising Participation by Learners and Employers.**
Government and development partners can create financial or policy incentives, such as subsidies, tax benefits, or grants, to encourage uptake of micro-credentials. The study shows that learners value affordable, accessible training, and employers are more likely to recognise micro-credentials when they are aligned with workforce development strategies. Incentives can accelerate adoption and foster a culture of lifelong learning [3, 10].
4. **Encouraging Sector-Specific Recognition and Validation.**
Given that employer recognition varied by sector and skill type, policies should promote sector-specific validation systems for micro-credentials. Ministries and industry associations can develop competency standards for high-demand sectors, ensuring that credentials reflect verifiable skills and competencies relevant to each industry [5, 8]. In summary, the empirical findings of this study indicate that micro-credentials can effectively support rapid skill acquisition, workforce flexibility, and career mobility. For maximum impact, educational institutions must integrate micro-credentials strategically, strengthen partnerships with employers, and provide clear learner guidance. At the policy level, national frameworks, accreditation standards, and sector-specific recognition are essential to ensure credibility, facilitate labour market uptake, and embed micro-credentials into lifelong learning and national development strategies.

6 Conclusion

This study explored the role of micro-credentials in supporting skill development and workforce adaptability in Uganda through a mixed-methods approach combining surveys, semi-structured interviews, and document analysis. By incorporating the perspectives of learners, employers, and educators, the research provides insight into the current use and perceived value of micro-credentials within a resource-constrained context.

The findings suggest that micro-credentials can facilitate the acquisition of specific, job-relevant skills within relatively short timeframes. Many learners reported faster skill acquisition compared with traditional programmes and indicated that newly acquired skills were applied soon after completion, particularly in digital, technical, and entrepreneurial fields. Employers generally recognised the practical relevance of micro-credentials for technical upskilling, although concerns regarding programme quality, accreditation, and familiarity limited broader confidence and acceptance.

Institutional analysis indicates that micro-credential initiatives in Uganda remain fragmented, often operating as pilot or donor-supported projects with limited integration into formal degree pathways. The lack of standardisation, national accreditation frameworks, and credit transfer mechanisms constrains their scalability and consistent recognition in the labour market. As a result, while micro-credentials show promise as flexible and modular learning options, their current contribution is shaped by wider systemic and policy conditions.

Overall, the study offers empirical evidence that micro-credentials may complement existing education and training systems by supporting targeted upskilling and workforce responsiveness. However, their longer-term effectiveness will depend on strengthened policy coordination, clearer quality assurance mechanisms, and sustained engagement between educational institutions and employers. Advancing national frameworks and industry–academia collaboration will be important for enhancing the relevance and credibility of micro-credentials in Uganda and comparable Sub-Saharan African contexts.

Acknowledgements

None.

Author contributions

Conceptualization, K.K.; methodology, A.U., K.K.; investigation, A.U., K.K.; writing—original draft preparation, A.U., K.K.; writing—review and editing, A.U., K.K.; visualization, A.U., K.K.

Funding

None.

Data availability

The datasets generated during and/or analysed during the current study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

Kampala International University Research Ethics Committee granted the study ethical approval under reference number: KIU-2025-062, in accordance with the Uganda research guidelines and regulations. All participants provided their written consent to take part in this study.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Received: 9 August 2025 / Accepted: 9 February 2026

Published online: 14 February 2026

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