



# Micro-credentials and the Future of Learning

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## Keywords

Micro-credentialing, Higher Education, Workforce Development, Lifelong Learning

## Abstract

Despite the lack of a widely accepted definition, scope and regulation (Varadarajan et al. 2023), the use of micro-credentials (MCs) holds immense potential to address the challenges of traditional higher education, particularly in terms of accessibility, flexibility, employability, and inclusivity. This study delves into the rise of micro-credentialing and its evolution in the education and training landscape post-COVID-19. It identifies the challenges and unanswered questions that primarily emanate from a lack of clarity regarding applicable quality standards and regulatory frameworks and the undefined breadth of the scope and function of MCs.

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# 1. Introduction

Micro-credentials (MCs) represent a form of alternative credentialing that aims to recognise specific skills, knowledge, or achievements that traditional degree programs may not adequately capture (Kato et al., 2020). At the moment, there is no universally accepted definition of micro-credentials and no comprehensive regulation of their provision (Olivier, 2021; Brown et al., 2021; Bozkurt & Brown, 2022; Varadarajan et al. 2023). According to Brown et al. (2021), there is still much confusion regarding their definition and where they fit in the education and qualification framework. To add to the complexity, different terms are used interchangeably, referring to a somewhat overlapping scope, such as “nano-degrees”, “digital badges”, “micro-certifications” and “MOOCs” (Lemoine & Richardson, 2015).

In recent years, micro-credentialing has emerged as an innovative solution to the challenges faced by traditional higher education systems, particularly in effectively preparing students for the workplace. There is significant adoption of micro-credentials (MCs) across the globe, as they present several benefits and opportunities, such as flexibility, enhancement of employability, graduate and employee upskilling, and support for life-long learning and career mobility (McGreal & Olcott, 2022; Pirkkalainen et al., 2023; Alasmari & Alzahrani, 2024; Hopkins/Moller 2024). They promote inclusivity in education and training and align with the younger generations’ mindset (Reed, 2023).

However, there remain challenges and unanswered questions that primarily emanate from a lack of clarity regarding applicable quality standards and regulatory frameworks and the undefined breadth of their scope and function (Varadarajan et al., 2023; Wheelahan & Moodie, 2021; Raj et al., 2024; Gauthier, 2020). Are they (or should they be) credit-bearing? How are their learning outcomes (skills and knowledge) assessed? Are there widely recognised and applied quality standards? The inconsistencies across various regulatory frameworks adopted at the regional and domestic levels do not support the broader adoption of MCs (Kušić et al., 2022). Furthermore, the reluctance of academic institutions to recognise credits and/or prior learning awarded through MCs, coupled with the prevalence of fraudulent claims

about authenticity and integrity, create further barriers to their growth (Oliver, 2021; Orman et al., 2023).

This paper adopts the recent definition of micro-credentials by UNESCO in 2022. It considers the relevant literature, including reports on the perspectives and interests of different stakeholders, such as academic institutions, employers and learners. Through this study, we aim to critically evaluate the benefits and opportunities presented using micro-credentials and the existing barriers, ethical questions and challenges for higher education their adoption faces. Furthermore, we identify the gaps in the MC landscape that shape and support relevant criticism and need to be addressed to promote effective adoption and optimisation of the integration of MCs in the education and training space. The study acknowledges the impact of the COVID-19 pandemic, which accelerated the shift towards digital learning on MOOC (Massive Open Online Courses) platforms, on the adoption and implementation of micro-credentials.

The paper focuses on South Africa as an example of a region where accessibility, employability, and inclusivity are paramount and where MCs offer a promising alternative to conventional educational pathways. We examine the potential of MCs to complement the National Qualifications Framework (NQF) and significantly enhance the recognition and value of employability skills, thereby ensuring the relevance and applicability of the education system.

Using a qualitative approach, the study analyses policy documents, reports, published articles, and case studies of micro-credentialing initiatives. The findings suggest that MCs can bridge the gap between traditional education and the job market, offering a more inclusive and flexible framework for lifelong learning and employability. However, there remain challenges and unanswered questions that primarily emanate from a lack of clarity regarding applicable quality standards and regulatory frameworks and the undefined breadth of their scope and function (Varadarajan et al., 2023; Wheelahan & Moodie, 2021; Raj et al., 2024; Gauthier, 2020). Are they (or should they be) credit-bearing? How are their learning outcomes (skills and knowledge) assessed? Are there widely recognised and applied quality

standards?

The inconsistencies across various regulatory frameworks adopted at the regional and domestic levels do not support the broader adoption of MCs. Furthermore, the reluctance of academic institutions to recognise credits and/or prior learning awarded through MCs, coupled with the prevalence of fraudulent claims about authenticity and integrity, create further barriers to their growth (Oliver, 2021; Orman et al., 2023).

An ethical dilemma arises when micro-credentials are designed exclusively for a single employer or a specific industry without broader recognition. While employer-driven MCs can offer targeted upskilling, their lack of standardisation and transferability risks creating closed learning pathways that may not support long-term career mobility. Without rigorous quality assurance mechanisms, such credentials may contribute to a fragmented education landscape, potentially disadvantaging learners who seek broader recognition beyond their current employment context. These concerns highlight the need for a balanced approach that ensures MCs remain industry-relevant and widely portable within national and global qualification frameworks.

Scholars, at this point, look back at traditional degree qualifications and look forward to the new demands of the digital era and the world of work. MCs are the doorway between the two epochs. However, the unanswered question is: Where do we go from here? What is the future of learning?

## 2. Methodology

According to Snyder (2019), the literature review has become more relevant than ever as a research method. A practical and well-conducted review synthesises research findings on a meta-level to create a strong foundation for advancing knowledge and facilitating theory development. Snyder distinguishes between three types of review methodologies: systematic, semi-systematic, and integrative approaches.

For this article, the integrative approach is considered most appropriate. Snyder (2019) explains that some research questions require more creative

data collection. In such cases, the integrative review approach is helpful. The purpose of the integrative review method is not to cover all articles ever published on the topic but rather to assess, combine, critique, and synthesise the literature on a research topic in a way that enables new theoretical frameworks and perspectives to emerge.

Most integrative literature reviews aim to address either older and established subjects or emerging subjects. When dealing with established subjects, employing an integrative review method provides an overview of the existing knowledge, conducts a critical assessment that may lead to re-conceptualisation, and augments the theoretical framework of the specific topic as it progresses. In the case of emerging subjects, the purpose is primarily to develop initial or preliminary conceptualisations and theoretical models instead of reviewing pre-existing models. This form of review often necessitates a more imaginative gathering of data, as the objective typically involves combining perspectives and insights from various disciplines or research traditions rather than encompassing all articles ever published on the subject. Integrative literature reviews are a versatile and rigorous form of research that aims to synthesise and critically analyse the existing body of knowledge on a particular topic (Torraco, 2005). Unlike traditional narrative reviews, which often merely summarise the literature, integrative reviews strive to generate new insights and perspectives by systematically analysing, critiquing, and integrating the findings from a wide range of studies (Alsalamy, 2022; Torraco, 2005).

### Steps in the process

Conducting an integrative literature review typically involves several key steps. First, the researcher must identify an appropriate topic or issue that would benefit from a comprehensive literature synthesis (Torraco, 2005). Once the topic is selected, the researcher must justify why a literature review is the most suitable approach for addressing the research question or problem (Torraco, 2005).

Next, the researcher must thoroughly search and retrieve the relevant literature, ensuring the search is comprehensive and systematic (Torraco,

2005). The Boolean search method can be applied. This step is crucial, as the quality and breadth of the literature included in the review will directly impact the validity and generalisability of the findings (Torraco, 2005).

After gathering the relevant literature, the researcher must critically analyse and evaluate the existing research, identifying patterns, trends, and gaps in the knowledge base (Torraco, 2005; Alsalami, 2022). This analysis serves as the foundation for the subsequent synthesis, where the researcher aims to create new understandings of the topic by integrating and interpreting the findings from multiple studies (Torraco, 2005).

To source articles, an Emerald, Ebscohost, and Google Scholar search was done. The including criteria were that the articles must be in English, published in academic journals and downloadable. The opinions and definitions of the different researchers were synthesised to contribute to an overview of the existing body of knowledge and conceptualise a possible contribution to existing theory regarding MCs to broaden understanding and add perspectives.

### Data analysis

The data analysis part of an integrative or critical review is not mainly developed according to a specific standard (Whittemore & Knafl, 2005). While there is no strict standard, the general aim of data analysis in an integrative review is to critically analyse and examine the literature and the main ideas and relationships of an issue. Articles published will be analysed to identify the progress and innovation in academic research on MCs over the last ten years and explore the trends in which they are developing.

An integrative review method should advance knowledge and theoretical frameworks rather than provide an overview or description of a research area. The integrative literature review is a sophisticated form of research that requires a high degree of skill and insight (Torraco, 2005). Unlike other types of literature reviews, integrative reviews are expected to move beyond simply summarising the literature and instead offer valuable new perspectives and theoretical frameworks that can advance the field of study (Alsalami, 2022;

Torraco, 2005). In this article, the review will use literature to pave the way for the future adoption of MCs in higher education and lifelong learning.

### 3. Literature Review

With the massification, commercialisation, and globalisation of higher education, employability has emerged as a key indicator that defines its role and the quality of academic provision (Chan, 2016). In this contemporary context, the vocational purpose of education seems to be gaining priority over its developmental purpose in the long-standing debate between the two (Tight, 2023). This is driven, or at least supported by national governments, also in South Africa, that address employability as the core purpose of Higher Education. For example, the Office for Students in the UK imposes, as a condition for registration (B3 conditions), the obligation to all HE providers registered with it to “deliver successful outcomes for all of its students which are recognised and valued by employers, and/or enable further study” (OfS, 2021). In this context, higher education institutions (HEIs) increasingly focus on their students’ employability skills to improve their chances of entering the job market, which is an integral part of their KPIs. In parallel with this, the shift of focus from the recognition of conventional qualifications to MCs has also emerged as a trend, which stems from a long-standing debate on the value of degrees for the future of work.

#### Theoretical Framework: Definitions and approaches

Micro-credentialing has emerged as a significant phenomenon in the global educational landscape, offering a unique approach to skill development and recognition that complements traditional degree programs or even replaces them, as argued by some scholars (Varadarjan et al., 2023). This paradigm shift is driven by the growing realisation that traditional educational models, focused on seat time and degree attainment, do not always align with the dynamic needs of the modern workplace. From a global perspective, the United States, Europe, New Zealand, and Australia have taken the lead in supporting MCs, particularly among universities and colleges (Rossiter & Tynan, 2019). This trend is not limited to these regions, as emerging

developments are also occurring in Canada, Peru, Indonesia, Mexico, the United Arab Emirates, South Africa, Malaysia, and other parts of the world (McGreal et al., 2022). In addition to this growth, there is increased interest and public commentary from government, higher education, and corporate leaders internationally, who recognise the potential of MCs to address skills and competency gaps. In Ireland, the Irish Universities Association has committed itself to developing a national micro-credential system for universities over the next few years to indicate where MCs will fit into the national qualification framework. Australia, Canada and the Netherlands also indicated that they are on the brink of adopting uniform national approaches to micro-credentialing (Brown et al., 2021). Various models are also under review in the UK for incorporating MCs into UK Higher Education (Hopkins & Moller, 2024).

One of the most problematic areas for those researching MCs is the absence of a universally accepted definition. Providers, governments and policymakers use several terms to refer to digital learning units, including digital badges, verified certificates, micro-qualifications, etc. There is a wide overlap across the scope and meaning of those terms, as well as important distinctions, mainly referring to the standards of quality assurance implemented, the requirement of learning outcomes and the integration of assessments. The definitions proposed or adopted at the national or regional level reflect differing approaches to MCs and the varying degrees of regulation of their award and recognition.

The European Union defines MCs as: “The record of the learning outcomes that a learner has acquired following a small volume of learning. These learning outcomes will have been assessed against transparent and clearly defined criteria. MCs owned by the learner can be shared and are portable. They may be stand-alone or combined into more considerable credentials. They are underpinned by quality assurance, following agreed standards in the relevant sector or activity area. Learning experiences leading to MCs are designed to provide the learner with specific knowledge, skills and competencies that respond to societal, personal, cultural or labour market needs (Council of the EU 2022). This definition is quite comprehensive and covers the purpose and use of MCs. It emphasises the requirements for quality

assurance, assessment against standards, flexibility, and portability, as well as the nature of their learning outcomes in the form of knowledge, skills and competencies. It has, therefore, been adopted by jurisdictions outside the European Union, such as the UAE (UAE Ministry of Education, 2023). However, it does leave room for broad interpretation of the relevant quality standards setting, monitoring, and regulation of the award and recognition of MCs.

MicroHE, a project funded by the European Commission to conduct the first pan-European survey on MCs, has adopted the terminology outlined in the following table.

Term	Definition
Credential	A documented statement that acknowledges a person’s learning outcomes or achievements.
Micro-Credential	Sub-unit of a credential or credentials (could be micro, meso, mini, etc) that could accumulate into larger credentials or be part of a portfolio.
Qualification	A formal outcome of an assessment and validation process obtained when a competent authority or body determines that an individual has achieved learning outcomes to given standards. Qualifications form part of the European Qualification Framework.
Micro-qualifications	A sub-unit of a qualification. While generally, micro-qualifications are not mapped to EQF, some countries allow for this possibility (e.g. Malta), and non-EU countries copy the practice too (e.g. Singapore).
Recognition	Process of acknowledging or accepting a statement of any type of credential.
Learning Passport	An official document that contains the description of the learning a

	person has done. For example, a Credit Supplement (diploma supplement for smaller achievements).
Credentials Clearinghouse	Repository of digitised, processed “Learning Passport” content.

In the UK, the Quality Assurance Authority (QAA), referring to the EU definition, adopted in 2022 a Characteristics Statement on MCs, which defines an MC as ([www.qaa.ac.uk](http://www.qaa.ac.uk)):

- *Credit-bearing against a recognised level of the Qualifications Frameworks*
- *Subject to standard quality assurance mechanisms*
- *Not typically an award in its own right on the Qualifications Frameworks, although there are no upper or lower limits on the amount of credit a micro-credential carries.*

This definition, which is not integrated into relevant legislation and does not reflect a regulatory requirement, merely sets broad parameters for recognising MCs. It allows considerable autonomy and discretion for UK higher education institutions to shape their MC policies, providing flexibility to foster innovation. This could lead to credentialing monopolies, where learners invest in training that lacks broader academic recognition. Embedding employer-specific MCs into existing qualifications without independent scrutiny could compromise academic impartiality and educational equity.

On the other end of the spectrum, New Zealand is an early adopter of micro-credentialing, given its history of embracing innovation. It integrated MCs early into its regulated education and training system and established the New Zealand Qualifications and Credentials Framework (NZQCF) in 2019. MCs are small, stand-alone awards with set learning outcomes that recognise learners’ skills, experience or knowledge while meeting demands from employers, industry and communities (NZQA, 2022). MCs listed on NZQCF must be up to 40 credits in size, at any level of the NZQCF, to have an assessment component, to be delivered by accredited education providers and to be developed as a response to evidence that they are needed. New Zealand’s process is very much grounded in precise and stringent criteria. Including

these broad standards as minimum requirements would provide a clearer benchmark for other jurisdictions considering MC adoption.

Australia, acknowledging the technological change and rapid transformation driven by COVID-19, developed 2021 the National Micro-credentials Framework 2022 (Australian Department of Education, Skills and Employment, 2021). Following broad consultation, it adopted the following definition, integrated into the Australian Qualifications Framework: “A micro-credential is a certification of assessed learning or competency, with a minimum volume of learning of one hour and less than an AQF qualification, that is additional, alternate, complementary to or a part of an AQF award qualification”. With the adoption of the Framework, the Australian Government identified four principles that govern MCs: they need to be outcome-based, driven by industry needs, tailored to support lifelong learning and transparent and accessible.

Given the disparity of definitions and fragmentation of regulation of MCs through the various national frameworks, in 2022, UNESCO proposed a common definition of MCs to support international credibility and portability of MCs. According to this definition:

*A micro-credential:*

- *Is a record of focused learning achievement verifying what the learner knows, understands or can do.*
  - *Includes assessment based on clearly defined standards and is awarded by a trusted provider.*
  - *Has standalone value and may contribute to or complement other micro-credentials or macro-credentials, including through recognition of prior learning.*
  - *Meets the standards required by relevant quality assurance.*
- (UNESCO 2022)

This definition reflects the outcome of a consensus among a panel of 47 experts from diverse regions and education sectors and the aspiration that MCs if done well, can be a “force for good” to supplement and complement traditional education systems and support learners to lead better lives and

healthier communities. Acknowledging the need to accommodate differing approaches and intending to act as a reference point and leave the regulation of specific requirements to domestic jurisdictions, the UNESCO proposed definition remains generic. According to the report introducing the definition, consensus proved challenging in three specific areas: the inclusion of recognition of prior learning, the most appropriate terminology to describe “trusted providers”, and whether it was appropriate to refer to quality assurance standards explicitly.

### Overview of existing research on micro-credentials

After a literature search, the articles and reports in Table 1 could be retrieved (on 17 July 2024). Since these articles and reports are viewed as data, they are not listed again as references in the reference list at the end of this article. Only those referred to in the rest of the article have been listed. The oldest article that could be found was published in 2014. The table oversees 89 articles published within the last ten years. Before COVID-19 was diagnosed and the lockdowns started, 32 articles were published in the preceding six years. Most articles, 44, were published during and after the period when all learning activities moved online due to COVID-19, during the three years of 2021- 2023. COVID thus accelerated the shift towards digital learning and an innovative way of upskilling.

**Table 1: Articles published on micro-credentials**

	Article title	Authors	Year	Citations	References
1	The use, role and reception of open badges as a method for formative and summative reward in two Massive Open Online Courses	Cross, S., Denise Whitelock, D., & Galley, R.	2014	26	29
2	Exploring the use of micro-credentialing and digital badges in learning environments to encourage motivation to learn and achieve	Clayton, J., Elliott, R., & Iwata, J.	2014	27	12

3	Developing Open Badges: A Comprehensive Approach	Devedzic, V., & Jovanović, J.	2015	91	51
4	A History and Frameworks of Digital Badges in Education	Ostashewski, N., & Reid, D.	2015	43	19
5	Micro-Credentials, Nano Degrees, and Digital Badges: New Credentials for Global Higher Education	Lemoine, P.A., & Richardson, M.	2015	62	50
6	Open badges: A best-practice framework	Voogt, L., Dow, L., & Dobson, S.	2016	1	66
7	Technology and Learning: Preparing Teachers for the Future	Lemoine, P.A. M., Yates, H., & Richardson, M.	2016	2	91
8	Challenges for adult skill formation in the globalising learning economy – a European perspective	Lundvall, B., & Rasmussen, P.	2016	23	44
9	Understanding digital badges in higher education through assessment	Abramovich, S.	2016	46	12
10	To what extent do discipline, knowledge domain and curriculum affect the feasibility of the Recognition of Prior Learning (RPL) in higher education?	Harris, J., & Wihak, C.	2017	19	37
11	Perceptions and Uses of Digital Badges for Professional Learning Development in Higher Education	Dyjur, P., & Lindstrom, G.	2017	64	20
12	The Emerging Formalization of MOOC Coursework: Rise of the MicroMasters	Caudill, J.	2017	11	0
13	The effect of perceived relevance of digital badges on student engagement	Higashi, R.M.	2018	1	116
14	Global Marketing of Higher Education E-Learning	Mense, E.G., Garretson, C., Lemoine, P.A., & Richardson, M.	2018	3	127

15	Teachers' perceptions of digital badges as recognition of professional development	Jones, W.M., Hope, S., & Adams, B.	2018	30	20
16	Micro-credentialing in Mobile Learning: Implications for Impactful Design	Pechenkina, E.	2018	1	39
17	An exploration of the utility of digital badging in higher education settings	Carey, K., & Stefaniak, J.E.	2018	66	56
18	Digital badges, do they live up to the hype?	Roy, S., & Clark, D.	2018	22	44
19	A Learner-Centred Approach for Lifelong Learning Powered by the Blockchain	Mikroyannidis, A., Domingue, J., Bachler, M., & Quick, K.	2018	41	10
20	Goal Setting and Open Digital Badges in Higher Education	Cheng, Z., & Newby, W.T.	2018	41	49
21	Understanding the feasibility of micro-credentials in engineering education	Mischewski, B., & Christie, A.	2018	4	0
22	Marketing Micro-Credentials in Global Higher Education: Innovative Disruption	Lemoine, P.A., Wilson, W., & Richardson, M.	2018	7	64
23	To what degree? Alternative micro-credentialing in a digital age	Milligan, S. & Kennedy, G.	2018	54	
24	Digital credentialing: implications for the recognition of learning across borders	UNESCO	2018	86	
25	Micro-credentials in higher education institutions: an exploratory study of its place in Tanzania	Ghasia, M., Machumu, H.J., & Smet, E.D.	2019	33	27
26	Micro-credentials: the potential of personalized professional development	Hunt, T.L., Carter, R., Zhang, L., & Yang, S.	2019	32	4
27	Decentralising online education using blockchain technology	Mikroyannidis, A., Third, A., & Domingue, J.	2019	14	9

28	The FAIR TRADE Framework for Assessing Decentralised Data Solutions	Domingue, J., Third, A., & Ramachandran, M.	2019	14	25
29	Creative Disruption in Higher Education	Lemoine, P.A., & Richardson, M.	2019	11	70
30	Instructional digital badges: effective learning tools	Newby, T., & Cheng, Z.	2019	23	52
31	Preparing students for university studies and beyond: a micro-credential trial that delivers academic integrity awareness	Ruddy, C., & Ponte, F.	2019	20	31
32	Instilling purpose and value in the implementation of digital badges in higher education	Stefaniak, J.E., & Carey, K.	2019	41	36
33	The use of Open Badges in library and information science education in Estonia	Virkus, S.	2019	6	33
34	Value of Open Microcredentials to Earners and Issuers	Young, D., West, R., & Nylin, T.A.	2019	14	31
35	Challenges and opportunities of micro-credentials in Europe: Briefing Paper on the Award, Recognition, Portability and Accreditation of Micro-Credentials: An Investigation through Interviews with Key Stakeholders & Decision Makers	MicroHE	2019		
36	The value of microcredentials: The employer’s perspective	Gauthier, T	2020	123	
37	The emergence of alternative credentials	Kato, S., Galán-Muros, V., & Weko, T.J.	2020	42	0
38	Microcredentialing of English Learner Teaching Skills: An Exploratory Study of Digital Badges as an Assessment Tool.	Purmensky, K., Xiong, Y., Nutta, J.W., Mihai, F., & Mendez, L.	2020	3	52

3 9	Getting Started With Open Badges and Open Microcredentials	Clements, K., West, R., Hunsaker, E.	2020	31	43
4 0	The use of Open Badges in library and information science education in Estonia	Askeroth, J., & Newby, T.	2020	5	64
4 1	Towards a European approach to micro-credentials: A study of practices and commonalities in offering micro-credentials in European higher education	Orr, D., Pupinis M., & Kirdulytė. G.	2020	36	
4 2	The Global Micro-credential Landscape: Charting a New Credential Ecology for Lifelong Learning	Brown, M., Mhichil, M.N.G., Beirne, E., & Lochlainn, C.M.	2021	43	59
4 3	Guidelines for open and online learning assessment and recognition with reference to the National and European qualification framework: micro-credentials as a proposal for tuning and transparency	Trepule, E., Volungevi- čienė, A., Teresevicienė, M., Dauksienė, E., Greenspon, R., Tamoliūnė, G., Šadauskas, M., & Vaitonytė, G.	2021	2	20
4 4	Digital badges: Pinning down employer challenges	Perkins, J., & Pryor, M.	2021	17	0
4 5	Micro-Credentials and Badges in Education: a Historical Overview	Gish- Lieberman, J., Tawfik, A., & Gatewood, J.	2021	20	21
4 6	How and why are digital badges being used in higher education in New Zealand?	Hartnett, M.	2021	11	43
4 7	How to Increase the Value of Digital Badges for Assessment and Recognition in Higher Education. A University Case	Trepule, E., Volungevi- čienė, A., Teresevicienė, M., Greenspon, R., & Costa, N.	2021	5	42

48	Micro-credentials: A learner value framework	Oliver, B..	2021	23	
49	Analysing micro-credentials in higher education: A Bernsteinian analysis.	Wheelahlan, L., & Moodie, G.	2021	176	
50	National Microcredentials Framework	Australian Department for Education, Skills and Employment	2021		
50	*A systematic literature review of micro-credentials in higher education: a non-zero-sum game	Ngoc, N.H.T., Spittle, M., & Van Dyke, A.M	2022	13	61
51	*Exploring the potential of micro-credentials: A systematic literature review	Tamoliūnė, G., Greenspon, R., Teresevicienė, M., Volungevičienė, A., Trepule, E., & Dauksienė, E.	2022	8	68
52	A strategic reset: micro-credentials for higher education leaders	McGreal, R., & Olcott, D.	2022	3	0
53	Unboxing micro-credentials: an inside, upside and downside view	Brown, M., & Nic-Giolla-Mhichil, M.	2022	19	50
54	Toward just and equitable micro-credentials: an Australian perspective	Desmarchelier, R., & Cary, L.J.	2022	22	33
55	*Implementation of micro-credentials in higher education: A systematic literature review	Ahsan, K., Akbar, S., Kam, B., & Abdulrahman, M.	2022	7	98
56	*Blockchain-based micro-credentialing system in higher education institutions: Systematic literature review	Alsobhi, H., Alakhtar, R.A., Ubaid, A., Hussain, O., & Hussain, F.	2022	25	33
57	Bridging the Gap: Micro-credentials for Development	McGreal, R., Mackintosh, W.G., Cox, G., & Olcott Jr, D.	2022	16	43

58	*Micro-credentials for Social Mobility in Rural Postsecondary Communities: A Landscape Report	Tinsley, B., Cacicio, S., Shah, Z., Parker, D.P., Younge, O., & Luna, C.L.	2022	5	0
59	The International Case for Micro-Credentials for Life-Wide And *Life-Long Learning: A Systematic Literature Review	Msweli, N.T., & Ismail, H.T.M.	2022	7	0
60	An assessment of micro-credentials in New Zealand vocational education	Fisher, R., & Leder, H.	2022	11	30
61	Features of Micro-credential Platforms in Higher Education	Kiiskilä, P., Hanafy, A., & Pirkkalainen, H.	2022	13	27
62	Harnessing the Benefits of Micro Credentials for Industry 4.0 and 5.0: Skills Training and Lifelong Learning	Shanahan, B.W. & Organ, J.	2022	4	4
63	*The evolution of a micro-credential	Ponte, F., & Saray, F.	2022	5	16
64	Micro-credentials and reflections on higher education	Orman, R., Simsek, E., & Çakır, M.A.K.	2022	5	23
65	Micro-credentials in leveraging emergency remote teaching: the relationship between novice users' insights and identity in Malaysia	Kumar, J.A., Richard, R.J., Osman, S., & Lowrence, K.	2022	19	70
66	Improving relevance and responsiveness: Aotearoa Nea Zealand's rationale for micro-credentials	New Zealand Qualification Authority	2022	2	
67	Global Skills and Education Study	IBM	2022	0	0
68	Towards a common definition of microcredentials	UNESCO	2022	33	
69	Guide to Design, Issue and Recognise Micro-credentials	European Training Foundation	2022	0	0

70	Characteristics Statement: Micro-credentials	UK Quality Assurance Authority	2022	0	0
71	*Exploring the potential of micro-credentials: A systematic literature review	Tamoliūnė, G., Greenspon, R., Teresevicienė, M., Volungevičienė, A., Trepule, E., & Dauksienė, E.	2023	8	68
72	Micro-credentials in digital form - lifelong development path	Nowakowski, M.	2023	0	0
73	A Strategic Institutional Response to Micro-Credentials: Key Questions for Educational Leaders	Brown, M., McGreal, R., & Peters, M.	2023	7	42
74	*The Implementation of Micro-Credentials in Formal and Informal Learning: A Systematic Literature Review	Rajabalee, Y.	2023	0	50
75	*A systematic review of the opportunities and challenges of micro-credentials for multiple stakeholders: learners, employers, higher education institutions and government	Varadarajan, S., Koh, J., & Daniel, B.	2023	21	95
76	Experiences with Micro-Credentials at UC3M: Academic and Technological Aspects	Hoyos, C.A., & Kloos, C.D.	2023	2	43
77	Micro-credentials and the role of evidence: increasing the potential for learner-centeredness, inclusivity and an expansive model of assessment and credentialing	Reed, A.	2023	3	38
78	Institute of Coding in Wales Digital Skills Bootcamps - A Model for Stackable Micro-credentials	Hopkins, C., Moller, F., & Robert, L.	2023	3	7
79	Using Skills Profiling to Enable Badges and Micro-	Ward, R.R., Crick, T., Davenport, J.,	2023	11	95

	Credentials to be Incorporated into Higher Education Courses	Hanna, P., Hayes, A., Irons, A., Miller, K., Moller, F., Prickett, T., & Walters, J.			
80	'People have Started Calling Me an Expert': The Impact of Open University Microcredential Courses	Chandler, K., & Perryman, L.	2023	1	28
81	*Making sense of the digital badging landscape in education and workplace settings: a scoping review of the empirical literature	Cumberland, D.M., Deckard, T.G., Kahle-Piasecki, L., Kerrick, S.A., Ellinger, A.D.	2023	2	65
82	Workforce upskilling: can universities meet the challenges of lifelong learning?	Lang, J.	2023	6	9
83	Micro-credentials and the role of evidence: increasing the potential for learner-centeredness, inclusivity and an expansive model of assessment and credentialing	Reed, A.	2023	7	
84	Micro-Credentials in US Higher Education: An Empirical Analysis	Lang, G. and Sharp, J.H.	2023	6	
85	Micro-credentials and reflections on higher education	Orman, R., Şimşek, E. & Kozak Çakır, M.A.	2023	19	
86	How might micro-credentials influence institutions and empower learners in higher education?	Pirkkalainen, H., Sood, I., Napoles, C. P., Kukkonen, A., & Camilleri, A.	2023	44	
87	Leveraging employment with micro-credentials: policy and practice of the Middle East and North African Universities	Alasmari, T. and Alzahrani, A.	2024	1	

8 8	The State of Micro-Credentials Implementation and Practice in Australasian Higher Education	Selvaratnam, R., & Sankey, M.	2024	11	60
8 9	Achieving professional qualifications using micro-credentials: a case of small packages and big challenges in higher education	Raj, R., Singh, A., Kumar, V. and Verma, P.	2024	6	

According to the data in Table 1, exploratory research on micro-credentialing was conducted between 2014 and 2021. Scholars started reviewing and systemising the accumulated knowledge in 2021 with the study of Gish-Lieberman, Tawfik, and Gatewood, who published a historical overview of MCs in education. Between 2022 and 2024, 11 reviews of the existing literature were published (indicated with \* in the table above). This period coincides with the COVID pandemic, which indicates that MCs have become a significant and relevant topic. COVID-19 as an external factor accelerated interest in the topic. The sudden changes in the way of education, namely the move online, as well as the changes in job market demands, namely remote working and new skill sets, as well as the rapid technological advancements, ignited interest in the topic, and the research regarding MCs gained momentum. It attracts more scholars at the moment. The fact that so many literature reviews saw the light also implies that a substantial body of knowledge exists at that stage that warrants synthesis and critical analysis.

Literature reviews help to identify areas of consensus and divergence in a field. They also indicate that scholars try to understand and compare different perspectives, approaches, and findings. A synergy from the selected articles and sources is presented, after identifying common themes. These themes act as headings for the discussion below.

### Micro-credentialing opportunities and challenges: Enhancing curricula, employability and lifelong learning

In today's rapidly evolving job market, micro-credentialing has become a valuable tool for individuals and institutions. MCs are small, targeted credentials that recognise specific skills or competencies, often in a shorter

time frame compared to traditional academic degrees (McGreal et al., 2022). These credentials can provide significant benefits to both learners and organisations. Brown et al. (2021) explain MCs as differentiated from traditional macro-credentials in the sense that it is non-status awards such as short courses and nano-credentials such as digital badges or certificates, and, in many cases, unbundled, credit-bearing but stackable credentials. They explain micro-credentials with the example of an individual learner who could have a non-credit-bearing badge in project management. This badge could be assessed as recognition of prior learning by a university or as part of a broader professional portfolio, which can contribute to a credit-bearing credential.

The shift towards micro-credentialing is driven by the recognition that the traditional credentials continuum needs to be reconsidered, with a greater emphasis on unbundling the content and the credential itself. Employers increasingly seek ways to certify applicants' specific competencies rather than relying solely on traditional degree programs. MCs offer a mechanism for employees to articulate their competencies, providing employers with a more precise understanding of an individual's skills and abilities (Gauthier, 2020). High-profile companies such as EY, Google, and IBM have adopted a recruitment strategy that gives people an opportunity based on non-traditional education and soft skills like grit, tenacity, and perseverance (Brown et al., 2021). Google wants to disrupt traditional education models by offering short courses that it will recognise as equivalent to a full bachelor's degree for recruitment purposes. In 2018, Google launched an Online IT support certificate through Coursera and created a consortium of more than 20 employers interested in hiring completers. More recently, Google launched its Career Certificates, which are designed to develop job-ready skills without people needing to attend a college or university. IBM offers badges to its staff and the broader public through its partnership with Coursera. They also partnered with the USA's Northwestern University to use IBM badges for professional master's degree programs. Amazon decided in 2019 to spend \$700 million to retrain 100,000 of its employees outside the traditional education system using its credential programs. The EY badging system, launched in 2017, offers staff the opportunity to upskill by earning a badge in

data visualisation, AI, data transformation, and information strategy. In 2020, the Trump administration signed an executive order emphasising skills rather than degrees in federal hiring. There is a growing belief that skills, rather than specific jobs or qualifications, will be more important in the future job market (Brown et al., 2021).

For learners, MCs offer the opportunity to have their skills and competencies formally recognised, which can lead to enhanced employability and opportunities for career advancement (McGreal et al., 2022) in a context where more and more jobs are disappearing due to the automation of basic tasks, and where many new high-skill jobs are emerging (Hopkins & Moller, 2024). At the same time, mid-career professionals can reskill and upskill to overcome challenges related to the transformation of the job market and benefit from career mobility opportunities. However, it is essential to note that MCs alone do not guarantee career success; they are one form of employability capital and an adaptive career behaviour that individuals may use to pursue their goals (Healy, 2021). Learners can access learning on-demand at a lower cost and with more choices, particularly in areas where skills are in high demand (Kato et al., 2020; McGreal et al., 2022). They can also stack it and use micro-credentials as a pathway to a larger or full qualification (Brown et al., 2021). Through this flexibility and accessibility, MCs support social inclusion and widen access and participation to education and employment for those learners who previously faced disadvantages due to financial or other barriers.

With the current growth in global population to about 8 billion people, of which 42% are under the age of 25, the traditional brick-and-mortar approach to education and traditional credentialing through degree programmes at universities can impossibly meet the projected growing demand for higher education worldwide through traditional delivery models. Many in industry and academia argue for the disruption of higher education and the unbundling of traditional degrees to better recognise nano talents and bite-sized blocks of learning (Brown et al., 2021) that will be more relevant to the needs of society and the changing nature of work, as well as to accommodate personal circumstances of individuals, their lifestyle, financial possibilities, capabilities, personality and job and employment possibilities.

From the institutional perspective, MCs can serve as a new revenue stream by tapping into new markets while decreasing costs associated with traditional educational programs (McGreal et al., 2022). These shorter, focused units of study offer flexibility and can be integrated into existing curricula through blended learning approaches (Sharma et al., 2024). Furthermore, stronger connections with employers and professional bodies can lead to a better understanding of the marketplace's evolving needs, enabling institutions to tailor their offerings accordingly (McGreal et al., 2022). In addition, MCs can help HEIs respond to calls from governments and regulators to become more flexible and learner-focused and accommodate the diverse individual needs of learners (OECD, 2023). The Employability Skills Micro-credentialing methodology, tested in East African universities, demonstrates promise in fostering pedagogical innovation and improving the visibility of employability skills (Maina et al., 2022). According to Brown et al. (2021), it is currently complementary to a full qualification. At most universities, MCs are part of larger programmes where they are credit-bearing modules. These programmes were unbundled for micro-credentialing purposes. Attaching credits to standalone modules is a new concept in higher education. The existing system was not built or designed for this (Hopkins & Moller, 2024).

Employers also stand to benefit from the adoption of micro-credentialing. The rise of MCs has been primarily driven by the need to upskill and reskill the labour force (OECD, 2023). MCs allow employers to assess and certify applicants' specific skills and competencies, enabling more competency-based hiring practices (Gauthier, 2020). This can be particularly valuable as organisations seek to adapt to rapidly changing technologies and business processes (McGreal et al., 2022). MCs allow employers and learners to access courses as and when needed, only addressing gaps in knowledge as and when discovered (Hopkins & Moller, 2024).

However, the rise of micro-credentialing is not without its challenges. Some scholars argue that MCs may seek to change the supply of educational qualifications to address a labour demand problem, potentially diverting students from more substantial credentials with greater long-term value (Wheelahlan & Moodie, 2021). Additionally, there are concerns that MCs

may further contribute to the privatisation and marketisation of higher education, potentially undermining its educational purposes, notably that of creating “knowledgeable citizenry” (Buchanan et al., 2020). Most importantly, despite the wide acknowledgement of the potential employability benefits of MCs, evidence of their impact is limited (Kato et al., 2020; UNESCO, 2022; OECD, 2023). The limited evidence of employability impact may be due to the scarcity of data covering completers of MCs, as well as their employment and wage outcomes. OECD suggests that the impact of MCs depends greatly on the course specifications, learners’ profiles and how the labour market is defined and measured.

Another challenge is that employers report a lack of clarity about MCs, either because of the vast and diverse range of offerings or the lack of universally accepted definitions and uniform regulations (Kato et al., 2020; UNESCO, 2022). The volume of providers and the overwhelming size of their diverse offerings can threaten MCs' credibility. This is further worsened by the fact that many providers not being linked to traditional education and training institutions, such as Universities and Vocational Education providers, are not (fully) trusted yet (Beirne et al., 2020; Cirlan & Loukkola, 2020).

Finally, a major concern regarding MCs' perceived integrity and credibility is the absence of quality assurance. One of the main reasons employers and learners have trusted traditional education degrees for years is that they and their offerings are subject to the vigorous regulation of national quality assurance authorities. When this is not the case for MCs in jurisdictions that have adopted a more flexible approach and have not integrated MCs into their national qualification frameworks, it undermines the trust of users and employers. This challenge is associated with the absence of a commonly accepted definition. The emerging trend that sees governments creating a framework to regulate and recognise MCs has the potential to address this challenge (UNESCO, 2022).

Despite these concerns, the potential benefits of micro-credentialing cannot be ignored. As the job market continues to evolve, micro-credentialing offers a flexible and targeted approach to skills development and recognition, with the potential to benefit learners, institutions, and employers alike (Gauthier,

2020; McGreal et al., 2022). According to a McKinsey Global Institute report, by 2030, about 14% of the workforce will need to switch occupational categories because of technological and other innovations (Brown et al., 2021). Around 85% of the jobs today's learners will be doing in 2030 have not yet been invented. Over the next few years, the rapid evolution of technology will reshape millions of jobs. Together with this, the skills demand continues to change, and people will thus continually need to re-train, reskill or redeploy to avoid redundancy and social and economic displacement in their local communities.

To ensure the long-term value and validity of MCs, institutions must develop robust rules and systems akin to those governing academic transcripts to ensure their integrity and transparency (Gauthier, 2020).

### The impact of COVID-19 on digital learning and micro-credentialing

The COVID-19 pandemic has profoundly impacted the education landscape, catalysing a rapid shift towards digital learning and the increasing prominence of micro-credentialing. As traditional educational institutions scrambled to adapt to remote instruction, the need for robust digital infrastructure and pedagogical approaches has become increasingly apparent.

The flexibility and responsiveness of internet-based learning approaches have become critical in this disruption, enabling service providers and learners to meet real-time market demands and expectations (Suguku, 2023). This has been further reinforced by the growing digital savvy of millennial learners, who are more inclined to adopt online learning modalities (Suguku, 2023).

The pandemic has also highlighted the critical importance of digital literacy for educational and vocational success, overall wellness, and participation in an increasingly digital society (Murray et al., 2022). Those without digital skills have faced significant challenges in accessing essential services, maintaining social connections, and remaining informed, underscoring the need for comprehensive digital upskilling initiatives.

Higher education institutions have been compelled to undertake rapid digital transformation in response to these challenges, leveraging various

technologies and platforms to sustain operations (Marks & Al-Ali, 2020). While this has exposed shortcomings in the digital readiness of many institutions, particularly in developing nations, it has also presented opportunities for innovation and collaboration (Mihovska et al., 2021).

One such innovation has been the rise of MC, which offers flexible, targeted, and often industry-aligned learning opportunities that can be easily integrated into lifelong learning journeys. The pandemic has accelerated the adoption of MCs as individuals seek to upskill and reskill in the face of economic disruption and changing labour market demands.

As the world navigates the long-term implications of the COVID-19 pandemic, the importance of digital learning and micro-credentialing will only continue to grow. Governments, educational institutions, and employers must work collaboratively to address the digital skills gap, invest in robust digital infrastructure, and ensure that learners have access to the tools and resources they need to succeed in an increasingly digitised world (Taylor et al., 2018; McGreal & Olcott, 2022; Nyashanu et al., 2023).

## 4. Micro-credentialing in South Africa

The current policy environment in South Africa is characterised by a drive towards high-skill jobs and innovation, linking research to new forms of production and services (Winberg et al., 2014). This has led to considerable curriculum development across various fields and disciplines to support the "high skills" agenda. However, there is a concern about the lack of clarity regarding appropriate qualifications and skill levels for a developing country and what might differentiate skills programs from professional programs (Winberg et al., 2014).

Despite these challenges, South African education has earned international recognition. Initial education institutions have adequate resources to fulfil their roles, enabling graduates to access domestic and international job markets (Vakalisa, 2005). Nevertheless, the current high unemployment rate among South African youth, although it can be attributed to various factors, including the country's economic climate and the legacy of inequalities in

educational provisioning (Vakalisa, 2005), needs to be addressed, and micro-credentialing can play a part in finding a solution for this problem.

The World Economic Forum estimates that more than 97 million new job roles may emerge globally by 2025. From a South African perspective, research suggests that up to 1.7 million new technology-enabled jobs could be created by 2030. However, these jobs require higher levels of education with varied skill sets and competencies, so a new shift in learning is required to develop a future-fit workforce that can enable economic and societal growth and development (Govender & Singh, 2022).

The Council on Higher Education provides the theoretical framework in which this study positions itself regarding offering MCs by higher education institutions in South Africa as outlined in Communiqué 2 of 2023. This framework states that MCs are emerging globally as flexible and responsive learning opportunities. Many countries are integrating them into their education systems, though uptake varies widely. In Southern Africa, including South Africa, policy and strategy development around MCs is in its early stages. National qualifications frameworks are still figuring out how to incorporate them despite some preliminary discussions and draft frameworks by various entities. Awareness among learners, employees, and employers is low. Significant barriers to access exist, such as limited internet access, devices, and social inequalities.

Key issues still to be considered, according to the CHE's framework, are:

- Defining MCs in the Southern African context.
- Registering MCs on national qualifications frameworks.
- Deciding if MCs should be credit-bearing.
- Enabling recognition of MCs, especially in workplaces.
- Understanding the relationship between MCs and full qualifications.
- Determining if stacking of MCs towards qualifications should be allowed and under what criteria.
- Ensuring quality assurance and identifying responsible entities.
- Establishing a repository for MCs.

- Advancing social justice through access to and achievement of MCs.

With partners, the Council on Higher Education initiated a project in 2023 to develop a broad Southern African framework for MC recognition, providing guidelines for individual countries and institutions. Higher education institutions that already offer MCs should maintain quality and integrity. They are advised to develop institutional policies covering governance, design, delivery, approval, marketing, resources, assessment, certification, records management, and continuous improvement.

Current regulations only allow credits for learning that is part of a qualification. However, modules taken for non-degree purposes could be recognised as credit-bearing MCs, potentially allowing recognition in formal qualifications through Credit Accumulation and Transfer (CAT) mechanisms. Other MCs can be recognised through a Portfolio of Evidence for Recognition of Prior Learning (RPL) for access to or advanced standing in formal qualifications.

Given this theoretical framework by the Council on Higher Education, no policies are in place, and studies and discussions are still seeking the way forward. This framework indicates thus a current gap and an invitation to debate and contributions. This article, with its integrative literature review, aims to contribute to the debate on finding a pathway to how micro-credentialing can contribute to inclusive education and workforce development in South Africa.

Micro-credentialing is emerging as a flexible and innovative approach to education in South Africa. It offers potential benefits such as motivating learners, supporting lifelong learning, and addressing skills gaps (Crafford & Matthee, 2016; Jones, 2022). MCs provide time and financial flexibility, can be stacked into larger qualifications, and offer a broader range of transdisciplinary competencies (Sibiya & Nyembezi, 2018; Msweli et al., 2022). They are particularly relevant in the context of high dropout rates in traditional degree programs and the need for more accessible education options (Vakalisa, 2005; Dias & Posel, 2007). The traditional South African university degree programme – spanning multiple years, premised on

students having a solid educational foundation – is in dire need of a rethink in a country where 39% of university students in contact programmes fail to graduate within six years of initial enrolment and a shocking 80% of distance learners fail to do so within ten years (Noutchie, 2024). Such programmes often inadvertently reinforce the inequalities and injustices they are meant to overcome. Part of the problem is structural. A three- or four-year commitment to a singular form of recognition (a degree) in a context where so many students cannot reach the finish line is wasteful and punitive. The ironic result is that many students end up with debts for degrees they never obtained and nothing to show on their CVs for what they learned (Jones, 2022).

However, challenges exist, including a lack of understanding, resistance to change, and the need for standardisation and integration into existing systems (Crafford & Mathee, 2016; McGreal et al., 2022). Despite these obstacles, MCs are a promising tool for bridging educational gaps, enhancing employability, and supporting lifelong learning in an increasingly digital world (McGreal et al., 2022; Msweli et al., 2022). To address this issue, the country is embarking on a joint effort by the Department of Education, Higher Education Institutions, and different non-governmental organisations to create a framework for MCs and existing higher education qualifications to fit in and support each other to the advantage and benefit of students, the world of work and institutions of higher learning. One of these partners is PoMiSA (Potential of micro-credentials in Southern Africa). The PoMiSA projects represent a collaborative endeavour among leading African and European universities, national councils, and strategic partners to explore and leverage the transformative potential of micro-credentials within the Southern African region.

### Potential of Micro-credentials in South Africa

MCs can offer adaptable, targeted learning opportunities aligned with industry standards. As technology replaces manual jobs, employees must reskill or upskill to re-enter the labour market (Tamoliūnė et al., 2023). This provides an alternative to the one-size-fits-all approach from which education stakeholders seek distance in flexible course offerings. MCs deliver the flexibility, accessibility, and affordability that learners need, bridging the

gap between traditional education and job market demands. In South Africa, MCs can address challenges in conventional degree programs, especially with low graduation rates (Jones, 2022). They can extend services in assessing and recognising non-formal and informal learning and introduce stackable credits (Tamoliūnė et al., 2023). Regardless of holding a degree, adults will increasingly need to reskill and upskill through flexible options rather than full degrees. MCs make higher education accessible to those previously excluded, addressing social mobility (Hopkins & Moller, 2024). This is crucial for aligning formal education skills with evolving job market needs. The COVID-19 crisis highlighted the need for greater transparency in accessible continuing education. Demand for online learning will persist, as many working adults enhanced their skills during the lockdown to adapt to a changing job market (Brown et al., 2021). With many people owning mobile phones and a tech-savvy younger generation, MCs can offer valuable pathways for education and career growth in South Africa, ensuring flexibility, competency-based assessment, and cost efficiency (Hunt et al., 2019).

## 5. Conclusion

According to initial research, MCs have the potential to provide adaptable and targeted learning opportunities that can be combined and aligned with industry standards. They can help to bridge the divide between traditional education and the evolving requirements of the job market. MCs are a new way of recognising and certifying skills. It is more inclusive and challenges traditional education models, offering a lifelong learning and employability framework. The grand ambition is to develop the mechanisms for stacking MCs across several universities to obtain a custom-made qualification in line with the student’s interest or career advancement needs.

Traditional university degrees are currently facing challenges from alternative forms of education. The job market increasingly emphasises specific skills, with many employers prioritising practical competencies over formal degrees. This shift is leading to a reassessment of the value of traditional university degrees. Some scholars believe that the importance of traditional

degrees may diminish as the primary qualification for skilled professions in the future (Ralston, 2021). On the other hand, Masa and Timmis (2021) argue that university degrees will still be important, but for different reasons: They provide a solid foundation for lifelong learning, offer opportunities to build stable networks, and allow individuals to associate with the brand of the university, thereby enhancing their personal branding. According to Coursera's CEO Jeff Maggioncalda (2023), in the future, universities will need to focus on attracting school-leavers to fill their campuses due to the increasing demand for the experience of leaving home, making friends, networking, meeting professors, gaining exposure, and obtaining an essential first qualification. Adult learners will learn through MCs and online. Getting them on campus in the future will become increasingly difficult.

MCs enable learners to customise their education based on personal interests and market demands, resulting in unique combinations of skills that closely align with specific career goals. This is particularly important in fields undergoing rapid technological advancement (Taylor et al., 2018; Caetano et al., 2023; Ward et al., 2023). By stacking MCs, even from different institutions, based on interest, career advancement, employability, or marketability, students or lifelong learners can position themselves for a qualification if the collection of MCs can be recognised and accredited by an institution or for a career opportunity. Stacking qualifications is gaining popularity as a more cost-effective and efficient approach to achieving educational and career objectives. For example, instead of pursuing a full degree, a student could complete a series of MCs demonstrating expertise in a specific area, such as cybersecurity. However, this approach is not without its challenges. Keevy and Chakroun (2015) caution that if degrees become merely an aggregation of MOOC credits, the traditional hierarchies of knowledge, skills, and competencies may be undermined, leading to fragmented learning experiences where deep understanding, application, and evaluation become inconsistent. Additionally, Milligan and Kennedy (2017) highlight concerns from providers, including issues of time, cost, privacy, ownership of micro-credentials, verification and integrity, and the acceptance of both students and faculty. Another pressing counterargument is the potential marginalisation of those without credentials, which is particularly

significant in South Africa, where access to formal qualifications remains a key issue. These concerns suggest that while stacking qualifications through micro-credentials offers flexibility, it also necessitates careful consideration of quality assurance and broader societal and ethical impacts.

On the other hand, educational institutions are beginning to recognise the potential of stackable credentials. Some universities have incorporated MCs into their existing frameworks, enabling students to earn credits towards degrees while attaining industry-recognised qualifications. This integration can enhance the traditional education system by providing pathways for continuous learning and skill development, especially for those who may not have the time or resources to commit to a full degree program.

This trend is becoming more apparent with the increasing number of educational providers and platforms offering stackable credentials. These credentials allow learners to enhance their existing qualifications through targeted learning experiences. As a result, this fosters a more personalised educational journey that can lead to improved employability in a dynamic job market (Taylor et al., 2018; Gehlhaus & Koslosky, 2022; Ward et al., 2023; Caetano et al., 2023).

A well-balanced approach that integrates MCs with traditional qualifications may be the key to creating a dynamic, inclusive, and future-proof education system that meets both individual aspirations and industry demands.

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## 7.Short biography

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