Review

Bridging the Skills Gap: A Case for Micro-Credentials in Academic Programs in Institutions of Higher Learning

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Bridging the Skills Gap: A Case for Micro-Credentials in Academic Programs in Institutions of Higher Learning

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Abstract: Nowadays, there is an increasing amount of scholarly literature highlighting the significant demand placed upon higher education institutions to equip students for the workforce and enhance their employability skills citing that most institutions produce graduates who lack the competences required in the job market. This theoretical paper explores the crucial role of micro-credentials in higher education programs amidst the changing job landscape. It addresses the skills gap by providing insights on how learners can obtain and provide tangible evidence of skills acquired to their prospective employees through digital badges, tailored to meet industry needs. Micro-credentials offer solutions for bridging the gap between academic learning and industry requirements, focusing on key competencies which include but are not limited to analytical thinking and technological literacy. The paper examines potential benefits of Micro-credentials, including flexibility and affordability, along with challenges like, time constraints on the side of students, lack of faculty awareness, accreditation issues and challenges related to their alignment with traditional education. Further, strategies for overcoming obstacles are proposed, with emphasis on collaboration and technology integration. Additionally, it highlights organizations/ institutions offering micro-credential courses, showcasing the growing recognition of these credentials in meeting the needs of learners and the workforce. This paper makes a significant contribution to the ongoing discourse on employability of graduates by emphasizing the strategic integration of micro-credentials in academic programs as an innovative approach to addressing skills gaps, fostering industry alignment, and enhancing workforce readiness in higher education.

Keywords: micro-credentials; higher education; skills gap; employability; workforce readiness; digital badges

1.0. Background

In recent years, an increasing amount of scholarly literature has emerged highlighting the significant demand placed upon higher education institutions to equip students for the workforce and enhance their employability skills (Suleman, 2018). Maryanti et al. (2020) assert that numerous graduates, even those of vocational schools, who are expected to enter the workforce promptly, often find themselves at risk of unemployment. This susceptibility to unemployment stems from the dynamic nature of the job market, where shifts in industry demands and technological advancements may lead to a disconnect between acquired skills and current requirements, a phenomenon one may call Workforce Skills Gap, defined by (Cappelli, 2015) as "the variance between the skill requirements of organizations and the current skills and capabilities of the relative workforce". It is very important for students to possess the capacity to adapt to various changes in their chosen fields. Therefore, cultivating adaptability becomes paramount for students, enabling them to navigate evolving job landscapes successfully (Maryanti et al., 2020).

In current education, different stakeholders have varying perspectives and expectations of what educational institutions should offer. Currently, the learner seeks brief, hands-on, and current

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courses aligned with their career goals (Varadarajan et al., 2023). As employers endeavor to gain deeper insights into the knowledge, skills, and capabilities of job applicants prior to extending offers of employment, they are increasingly adopting competency-based hiring approaches (Doherty-Restrepo et al., 2023). Oraison et al. (2019) echo by contending that employers actively look for and give priority to graduates with practical skills and 21st-century abilities like problem-solving and communication. Doherty-Restrepo et al. (2023) citing Vista (2020) acknowledge that obtaining 21st-century skills, which encompass a diverse array of skill sets and competencies considered essential in contemporary contexts , is crucial. Nevertheless, employers indicate that recent college graduates entering the workforce often demonstrate a deficiency in essential 21st-century skills (Goodman et al., 2015) cited in Doherty-Restrepo et al. (2023). There is a necessity for graduating students to acquire the skill set essential for contemporary work in the 21st century (Rios et al., 2020). The question is: Where and how will these skills be acquired and how will the graduates communicate these skills to the prospective employees? Remember, a college transcript only offers a concise overview of a student's academic performance, showcasing completed courses, grades, credit hours, and additional academic details as proof of meeting degree criteria (Doherty-Restrepo et al., 2023). Professional skills, though vital, are not documented in the college transcript, even though they are the ones employers are very much interested in.

In light of the above, there is a necessity for a method to clearly articulate the competencies and skills acquired by students during the course of their educational programs. This is where micro-credentialing comes into play, serving as a mechanism enabling students to document both soft and hard skills on their transcripts (Gauthier, 2020). This will enhance employability of graduates, as (Miller & Jorre De St Jorre, 2022; Porter, 2021) contend that to further the objective of enhancing employability within higher education, there is a pressing need for innovative approaches to integrating career-oriented skills into university curricula, as well as for the development of novel instruments to effectively communicate the proficiencies and competencies of students. Hence, micro-credentials present opportunities for acquiring 21st-century skills through approaches that are more centered on the individual student's needs and learning preferences (Varadarajan et al., 2023).

This paper looks into the prevailing skills gaps among graduates, and how micro credentials offer a viable solution to bridge these discrepancies. Anticipating challenges inherent in the adoption of micro credentials, the study proposes potential solutions to overcome these obstacles. By synthesizing existing literature, this research offers insights into the strategic integration of micro credentials within academic programs, providing recommendations for their successful implementation. Through this multifaceted approach, the paper aims to contribute to a deeper understanding of micro credentialing's role in addressing skills gaps and fostering graduate employability.

2.0. Understanding Micro-Credentials

Various definitions for micro-credentials exist, but there is no universally agreed-upon standard definition (Brown et al., 2021; Steel et al., 2022). According to Alamri et al. (2021) micro-credentials (MCs) are competency-based learning models that have emerged within higher education (HE) and the business sector. These models offer learners a digital badge (DB) upon successful completion, serving as a visual representation of the attained micro-credential and tangible evidence of acquired skills (Oliver, 2019a). Typically, micro-credentials are highly focused on specific disciplines or skills, customized to address industry needs and competencies (Tan. F, 2023).

Further, Cheng et al. (2020) provide further insight into digital badges (DBs), defining them as clickable images that signify mastery of a skill or knowledge. These badges are accompanied by metadata such as learning requirements, instructional materials, endorsement details, issue date, and institution, facilitating their creation, acquisition, and sharing in online spaces. In higher education and business contexts, micro-credentials often take the form of digital badges, providing learners with tangible evidence of their achievements (Alamri et al., 2021). It is worth noting that interest in the concept of micro-credentials has been reignited and intensified since the onset of the COVID-19

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pandemic (Brown & Nic-Giolla-Mhichil, 2022). During that period, Micro-credentials initially gained traction in higher education institutions catering to adult learners (Viano. A, 2023).

Currently, there are no widely accepted standards for the learning volume of a micro-credential (Tan. F, 2023). Despite the prefix "micro" implying a small volume, micro-credentials can vary from short courses lasting a few hours to boot camps spanning several days or more intensive certificates leading to formal qualifications (Tan. F, 2023). Porter (2021) adds that these micro-credentials typically involve a shorter duration than full award courses, spanning from one (1) hour to a hundred (100) hours of learning. This indicates that micro-credentials are relatively shorter than traditional study programs.

Micro-credentials can be either *stand alone* or *stackable* toward a degree. *A standalone micro-credential* is an individual and independent certification acquired through a specific short-term educational program. Tan. F (2023) argues that if micro-credentials are intended to contribute towards a university degree, they must possess significant depth and volume to meet the rigorous expectations associated with degree attainment. Moreover, each micro-credential should be meticulously curated to integrate fundamental concepts, theories, and industry competencies in a cohesive manner, enabling learners to promptly apply acquired knowledge (Viano. A, 2023). Furthermore, Tan. F (2023) emphasizes the necessity of integrating credit-bearing micro-credentials into existing student information systems due to their transcripted nature. Additionally, Tan. F (2023) stresses that the development of micro-credentials, whether designed for standalone delivery or for integration into degree programs for employed learners, entails careful consideration of various factors. Alongside well-designed micro-credentials featuring adequate depth and volume, flexible pedagogical approaches and support from employers, as well as acknowledgment of industry-acquired skills, are deemed crucial (Tan. F, 2023).

In the evolving landscape of education and workforce development, there is an apparent shift towards alternative credentialing methods. Ralston (2021) describes that the industry increasingly favors micro-credentials over traditional university degree programs as a means to upskill and reskill their workforce. Furthermore, employers acknowledge the significance of micro-credentials, underscoring the need to foster collaboration between higher education institutions and industry partners to address competency-based micro-credentialing gaps.

The integration of micro-credentials into higher education has gained momentum, particularly among adult learners, prompting a critical need for adaptable teaching methodologies and technological infrastructure. According to Viano. A (2023), as micro-credentials gained traction in higher education initially among adult learners, incorporating tools for remote and hybrid teaching is integral to any micro-credential program. Viano. A (2023) further emphasizes that adopting micro-credentials necessitates a reliable learning management system that is capable of facilitating asynchronous mode of instruction, along with dependable remote teaching tools for instructors, including collaboration software, audiovisual equipment, and a robust network infrastructure, as micro-credentials can be completed either online or through in-person instruction (Resei et al., 2019). This highlights the role ICT (both hardware and software) plays in current education system including in micro-credentialing initiatives.

3.0. Key Competencies or Skills and Attributes Identified in the Skills Gap, and How Can Micro-Credentials Address These Specific Gaps

The World Economic Forum, in the future of Jobs report 2023, highlights the core skills for workers in 2023. The six core skills listed, also identified as "skills on the rise" by the World Economic Forum (WEF), are:

i) Analytical thinking,

ii) Creative thinking,

iii) Resilience, flexibility, and agility

iv) Motivation and self-awareness

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v) Curiosity and lifelong learning

vi) Technological literacy

Literature characterizes these fundamental skills as comprising cognitive, interpersonal (social), and intrapersonal (emotional and self-regulatory) abilities. These skills are considered to be both adaptable and relatively consistent over time in the absence of external influences, and they can be applied across various job contexts (National Association of Colleges and Employers, 2022) as cited in Doherty-Restrepo et al. (2023).

According to the literature cited in Doherty-Restrepo et al. (2023), core skills encompass cognitive, interpersonal (social), and intrapersonal (emotional and self-regulatory) abilities that are flexible yet stable over time without external influences, and can be applied across various job contexts.

Soft skills are crucial interpersonal abilities that significantly impact our effectiveness in accomplishing tasks (LinkedIn Learning, 2020). According to LinkedIn Learning (2020), the most sought-after soft skills include creativity, collaboration, persuasion, adaptability, and emotional intelligence. These skills showcase one's capacity to collaborate with others effectively.

The looming workforce skills gap crisis projected for 2025 presents a pressing challenge for higher education institutions, as they are increasingly expected by government agencies, employers, and policymakers to develop innovative solutions (Horton, 2018). Cappelli (2015) recognizes the Workforce Skills Gap as the disparity between the skill requirements of organizations and the current skills of the workforce, probably the skills graduates leave their training institutions with. In response to a shortage of qualified job applicants, employers are becoming more open to hiring individuals with specific job-related skills, even if they lack advanced degrees, with the intention of refining these skills through on-the-job training (Viano. A, 2023). Similarly, a significant proportion of business executives are willing to consider candidates without formal academic credentials as long as they demonstrate relevant skills (Gallup, 2014) as cited in Doherty-Restrepo et al. (2023). Despite increased investments in skills training by companies, disparities in skill levels persist within the workforce, as emphasized by the World Economic Forum , WEF (2023).

One may ask about the relevance of traditional certifications. Do they still matter as they used to be? Gauthier (2020) answers the question that the relevance of traditional college transcripts is diminishing as they primarily focus on listing courses rather than showcasing skills, leading to skepticism among employers about their usefulness in hiring decisions. Porter (2021) adds that alternative Digital Credentials (ADCs), such as Micro-credentials, are expected to diminish the importance of transcripts by digitally highlighting workplace-oriented skills and capabilities. What Further, it is worth noting that education consumers prioritize courses that align well with real-world applications and career pathways (Gallup, 2019) not just traditional certification. Consequently, there is a growing need to document professional skills beyond traditional resumes or transcripts and that where micro-credentials emerge as a solution to this demand by providing a way to articulate competencies gained in educational programs and enrich transcripts with evidence of cognitive processes and practical knowledge acquisition (Gauthier, 2020). Moreover, when integrated into co-curricular programs, micro-credentials can engage nontraditional or online learners, documenting achievements valued by employers (Doherty-Restrepo et al., 2023).

Educational institutions and educational program designers need to understand the dynamic nature of every aspect of life. Changes in jobs and skills have big effects on businesses, governments, and workers worldwide. It's important to predict future trends, find the right talent for growth, and make smart decisions to handle disruptions in jobs and skills for employers and workers WEF, (2023). Introducing MCs in HE has the potential to revolutionize degree programs and alter how the prospective employees (students) learn and achieve their tertiary qualifications (Ahsan et al., 2023; Greene, 2019). What should be done then? This is the question of higher education institutions and all stakeholders need to pay attention to. In response, Bandyopadhyay et al. (2020) advocate for Higher Education Institutions (HEIs) to consistently update their curricula, emphasizing the need to align them with the dynamic demands of the job market. In addition, Almaleh et al. (2019) highlight

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the importance of regularly assessing the skills in demand to ensure that teaching aligns with employer expectations. This involves continuously verifying that students' learning corresponds with professional requirements. Other than that, institutions will keep producing graduates who lack the necessary skillset, and therefore irrelevant. They will either struggle to get employed or the employers will continue to spend on upskilling or reskilling them.

Despite challenges identified by (Müller et al., 2023) in achieving optimal alignment between curricula and students' knowledge requirements, integrating micro-credentials (MCs) in HEIs is feasible through increased collaboration among stakeholders, including the prospective employers. (Varadarajan et al., 2023). Moreover, Tan. F (2023) emphasizes the importance of collaborating with employers and industry organizations to pinpoint the skill deficiencies relevant to learners within their respective sectors. Therefore, a strategic approach for universities and other tertiary education institutions to emphasize routine assessment of job market skills and aligning Micro-credentials with the on-demand skills will enhance graduates' readiness for the professional domain, thereby ensuring the relevance of higher education, is crucial.

4.0. What Are the Potential Benefits Associated with Integrating Micro-Credentials into Academic Programs?

Different studies have highlighted how beneficial it is to integrate MCs into academic programs. Below are some of the benefits highlighted by different scholars**.**

4.1. Flexibility, Accessibility and Affordability

Whereas traditional programs have set schedules, rigorous admission requirements, costly and frequently requiring multi-year commitments, the beauty of MCs lies in the short time required to achieve an MC, flexibility and the low costs involved. According to Viano. A (2023), the value of Micro-credentials (MCs) lies in their ability to be obtained quickly, offering flexibility and affordability. Viano argues that one of their primary advantages is the shorter time required compared to traditional degree programs lasting two or four years. He acknowledges that MCs are particularly appealing to non-traditional students who have limited time for education due to full-time employment or family responsibilities and need to swiftly translate their learning into income. Additionally, micro-credentials serve as cost-effective professional development tools, significantly reducing training expenses and time commitments for employees (Ghasia et al., 2019).

Moreover, Varadarajan et al. (2023).highlight that students are eager to acquire skills rapidly to re-enter the workforce. The escalating expenses of higher education present a barrier to accessibility for many individuals (Mahamuni & Goteti, 2023). However, micro-credentials offer a promising solution to this issue by providing a more economical and attainable alternative to traditional degree programs. Porter (2021) notes that micro-credentials typically span a shorter duration and are more focused compared to conventional courses, often ranging from one hour upwards, thereby requiring less time and financial investment from learners.

Additionally, because micro-credentials can be earned online and often at one's own pace, they provide flexibility for individuals who may have financial constraints or other obligations that prevent them from pursuing full-time education. This flexibility and affordability make micro-credentials an attractive option for individuals seeking to upskill or reskill without incurring the high costs associated with traditional degree programs, thereby increasing access to education for a broader population.

4.2. Enhancing Workforce Performance and Career Development

Micro-credentials have power to enhance workforce and career development. Tan. F (2023) argues that micro-credentials, when sufficiently detailed and aligned with relevant industry competencies and skills, can effectively prepare learners for new job roles or functions in the workplace. Additionally, well-designed micro-credentials can serve as standalone qualifications to

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support professionals seeking to advance their skills throughout their careers (Tan. F, 2023). According to Porter (2021) micro-credentials offer a practical and efficient method of formally certifying competence and enhancing the alignment between individuals and job opportunities. Higher education institutions are well-positioned to lead the development and promotion of this approach as providers. Ghasia et al. (2019) add that micro-credentials present an alternative avenue for career and professional development, recognizing individuals' skills, achievements, and contributions. They provide opportunities for skill enhancement, career pathway management, and practical integration of academic content. However, for this initiative to succeed, HEIs must transition away from traditional approaches to assessment and credentialing (Porter, 2021).

4.3. Increases Employability

As employees are interested in practical skills and competences (Oraison et al., 2019), micro-credentials are portrayed as the best alternative credentials in enhancing employability by providing opportunities to cultivate 21st-century skills, including digital literacy, communication, collaboration, critical thinking, problem-solving, decision-making, and creativity (El Mawas & Muntean, 2018). By equipping learners with these essential skills, micro-credentials contribute to enhancing their employability (Selvaratnam & Sankey, 2021). This initiative starts with refining the curriculum by incorporating employability skills aligned with the latest market demands (Wheelahan & Moodie, 2022). At the course level, micro-credentials serve as valuable tools for nurturing specific graduate capabilities required in a rapidly evolving job market (Miller et al., 2020; Woods & Woods, 2023). Additionally, micro-credentials enable students to demonstrate and share their competencies and capabilities with potential employers (Perkins & Pryor, 2021), a feature that lacks with traditional credentials.

In the twenty-first century, continuous upskilling and reskilling are crucial for maintaining employability in light of the ever-changing demands for job skills (Selvaratnam & Sankey, 2021). Dynamic market requirements for graduate skills pose challenges to higher education institutions in meeting supply-side offerings (Pizarro Milian & Davies, 2020). Micro-credentials address this challenge by offering short, competency-based, industry-aligned units of learning that reduce discrepancies and bridge skillset gaps, thereby providing learners with market-relevant skills (Wheelahan & Moodie, 2022). Moreover, in developing countries, many higher education institutions face a growing gap between their curricula and the demands from society, business, and industry for a more flexible workforce with high competencies in problem-solving, teamwork, and project management (Mbarushimana & Kuboja, 2016).

4.4. New Pedagogical Approaches

The evolution of online learning has introduced new pedagogical approaches and techniques, providing a conducive environment for the implementation of micro-credentials, which greatly benefit from these advancements (Varadarajan et al., 2023). The twenty-first century, with its technological advancements such as Web2.0 Internet access and computer availability, presents an ideal landscape for the integration of micro-credentials (Varadarajan et al., 2023). In addition to making micro-credentials easier to deliver and access, these technological developments also make it possible for individualized, scalable, and effective learning experiences that are suited to the needs of the contemporary workforce.

4.5. Alignment with Formal Qualification

Micro-credentials, being shorter in duration compared to traditional accredited learning, can serve as additional, alternative, complementary, or component parts of formal qualifications (Brown & Nic-Giolla-Mhichil, 2022; Oliver, 2019b). They are designed to align with formal qualification levels such as Bachelor's or Master's degrees (Oliver, 2019b). Because of this alignment, micro-credentials

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can provide flexible pathways for skill development and career advancement, bridging the gap between formal education and lifelong learning.

4.6. Fostering Motivation

Research on motivation in the context of micro-credentials (MCs) primarily examines both extrinsic and intrinsic factors, rewards, punishments, retention, satisfaction, absenteeism, and achievement. Given that MCs are predominantly offered online in a self-paced learning environment, student motivation plays a crucial role in fostering learning engagement and course completion (Coleman, 2018). Extrinsic motivation among students often revolves around factors such as grades, badges, and recognition (Newby & Cheng, 2020). Studies suggest that visualizing achievements through the award of digital badges can stimulate motivation, foster social recognition, and enhance learner participation and engagement (Dyjur & Lindstrom, 2017). Additionally, badges can serve as incentives for goal attainment and may be customized to align with students' individual learning approaches (Alt, 2023). The desire for mastery, self-improvement, and personal interests, on the other hand, are what drive intrinsic motivation, which is essential for maintaining long-term participation in self-paced micro-credential programs. Through the combination of extrinsic rewards like badges and opportunities for meaningful, learner-centred experiences, micro-credentials can successfully support a range of motivational needs and foster successful learning outcomes.

5.0. What Strategies Can Institutions Adopt to Effectively Implement and Integrate Micro-Credentials into Existing Academic Structures?

Micro-credentials can be strategically integrated into academic programs in higher education (HE) through several mechanisms:

Curricular Integration

Integrating MCs into existing curricular is very important. It involves creating stand-alone courses that focus on particular skills or competencies especially those most desired in the workforce (Oliver, 2019b; Tan. F, 2023) or integrating micro-credentials into already-existing courses. In addition to traditional academic courses, these MC bearing courses can be offered, giving students the opportunity to acquire specific skills related to their field of study. Creating tests or learning exercises to gauge mastery of particular skills or competencies that match course objectives is the initial step in integrating micro-credentials into already-existing courses. Micro-credential-focused stand-alone courses can be created with specific learning objectives and evaluation standards based on the skills and competences on high demand.

Stackable Credentials

Institutions of Higher Learning can create courses that allow students to stack micro-credentials to obtain more advanced credentials, like degrees or certificates. This method gives students flexibility for those who might not be able to commit to a full degree program and enables them to gradually build upon their skills (Porter, 2021; Tan. F, 2023). It is necessary to map out a progression of Micro-credentials that lead to larger credentials, like degrees or certificates, when designing programs with stackable credentials. As students advance through the program, they should be able to accrue credits or competencies because each micro-credential should be built upon the one before it. It is more flexible and at the end, a student can obtain a higher qualification through self-paced engagement.

Co-curricular Activities

This involves incorporating opportunities for micro-credentials into extracurricular activities like research projects, internships, and volunteer work. Institutions can encourage student involvement in these worthwhile activities by utilizing Micro-credentials to acknowledge and reward the skills acquired through these experiences. Finding the skills or competencies that students can acquire through experiences like research projects, internships, or community service is the first step in incorporating micro-credential opportunities into extracurricular activities. Students will, in

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addition to gaining skills. be credited for the skills they learn if evaluation standards and recognition systems are established for these activities.

By employing the above strategies, integration into curricular, stackable, and co-curricular methods, institutions of higher learning can strategically incorporate micro-credentials into their programs to improve student learning and equip them with highly demanded skills. By giving students opportunities for individualized and flexible routes to reach their academic and professional objectives, these systems promote lifelong learning and adaptability in a world that is changing rapidly. In addition, recognizing the abilities students acquired through micro-credentials does not only improve their employability but also enhances their portfolios, guaranteeing that higher education stays in line with the ever-changing needs of the global job market, making their programs and their graduates relevant to the community.

The following are important in adopting Micro-credentials.

As institutions of higher education adopt Micro-credentials, the following need to be done.

Industry Partnerships

Collaborating with industry partners to create and offer micro-credentials that meet workforce needs. By involving employers in the design and delivery of Micro-credential programs, institutions can ensure that students learn skills that are directly applicable to labor market demands. Collaborating with industry partners to create Micro-credentials necessitates identifying in-demand skills or competencies relevant to specific industries. As these MC must align with industry needs (Tan. F, 2023), industry experts can provide feedback on the design of Micro-credential programs, such as curriculum development and assessment strategies, to ensure that graduates have the skills employers require.

Flexible Delivery Models

In adopting Micro-credentials, flexibility is very vital to ensure accessibility to all the interested. To ensure accessibility to a diverse student population, including non-traditional learners and working professionals, it is essential to use online and blended learning formats for the delivery of micro-credentials. These programs provide the flexibility required for people with different schedules and obligations by designing interesting and interactive online courses or modules (Thelma et al., 2024; Viano. A, 2023). Incorporating multimedia resources, interactive tests, and peer collaboration opportunities, not only enhances the learning process but also accommodates various learning styles, increasing overall efficacy and equipping students for the demands of a rapidly evolving digital world (Thelma et al., 2024). By removing barriers to entry and enabling students from a variety of backgrounds to gain the specific skills and competencies necessary for career advancement in the competitive job market of today, this approach democratizes education. Flexibility models ensure that no one is left behind, since different learning styles and learners needs are catered for.

Assessment and Accreditation

It is very important to establish strict assessment standards and quality control procedures to guarantee that micro-credentials uphold academic integrity and rigor. This could involve creating rubrics, carrying out peer review, or applying for accreditation from the appropriate accrediting organizations. This will, in addition to quality assurance, ensure credibility of such credentials.

All in all, incorporating micro-credentials into academic programs requires careful planning, collaboration among stakeholders, and a commitment to maintaining academic standards. However, when done effectively, micro-credentials can enhance the relevance, flexibility, and responsiveness of HE programs to the evolving needs of learners and the workforce.

6.0. Challenges and Barriers Might Hinder the Successful Implementation of Micro-Credentials to Bridge the Skills Gap in Academic Settings

Awareness issues among the faculty

The first challenge is related to the awareness of micro-credentials among the faculty. The awareness of micro-credentials among teaching staff is emphasized as part of the academic support

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challenge. Ghasia et al. (2019) suggest that there may be gaps in the understanding or acknowledgment of micro-credentials among those responsible for delivering education, possibly affecting the successful incorporation of these credentials into the teaching and learning environment. There are concerns about the understanding of micro-credentials among senior leaders and faculty members, as indicated by Pickard et al. (2018). This suggests that there may be a lack of clarity or awareness among key decision-makers and educators regarding the nature and benefits of micro-credentials. This is likely to affect the adoption of MCs by such educators.

The first challenge pertains to the awareness of micro-credentials within communities, particularly among teaching staff. Ghasia et al. (2019) highlight the importance of raising awareness of micro-credentials among educators as part of the academic support challenge. They suggest that there might be gaps in the understanding or recognition of micro-credentials among those responsible for delivering education, potentially impacting the successful integration of these credentials into the teaching and learning environment. Concerns about the comprehension of micro-credentials among senior leaders and faculty members are also noted by Pickard et al. (2018). This indicates a potential lack of clarity or awareness among key decision-makers and educators regarding the nature and advantages of micro-credentials.

Alignment with Traditional Education

Another challenge is the perceived contrast between micro-credentials and the traditional century-old education system. Education institutions may struggle to adapt swiftly to the dynamic nature of micro-credentials, potentially necessitating a shift towards privatization to keep up with the pace of change. The example of MIT selling EDX underscores this point. Nonetheless, privatization could potentially elevate the marketization of micro-credentials to a greater extent (Varadarajan et al., 2023).

Time constraints and commitments

Tan. F (2023) argues that in addition to academic and employer support, individuals managing work, study, and personal commitments need an extra boost to overcome challenges. Offering such assistance, exemplified by success coaching, could play a crucial role in facilitating their success. In a related study, Doherty-Restrepo et al. (2023) found that certain learners opt to withdraw from micro-credential programs due to conflicting commitments and time constraints, hindering their ability to meet program requirements. Additionally, the time faculty members require to assess assignments poses a challenge to students' progression from one module to the next (Doherty-Restrepo et al., 2023).

Digital divide

In the field of micro-credentials, Viano. A (2023) highlights the potential issue of device accessibility for learners. This implies that universities equipped with programs providing students with laptops, tablets, Wi-Fi hotspots, and other technological resources hold a distinct advantage in ensuring accessibility and overcoming potential barriers. Essentially, ensuring students have the necessary devices can significantly enhance their learning experience in the micro-credential landscape.

Unbundling offerings

Within the educational landscape, students are increasingly viewed as consumers, engaging in a market where they have the autonomy to select preferred products and service providers. The effectiveness of this educational transaction is measured through student satisfaction scores (Varadarajan et al., 2023). Higher education institutions are contemplating the 'unbundling' of their offerings, intending to offer only those components that align with market preferences (Ivancheva et al., 2020). However, this dynamic poses a challenge in the context of micro-credentials, as the emphasis on unbundling may hinder the provision of comprehensive and integrated micro-credential programs that meet the diverse needs of learners. (Steel et al., 2022)echo this challenge, asserting that at the core of the controversy surrounding micro-credentials lies the disruption and unbundling of traditional education. Steel et al. (2022) reinforce the complexity surrounding micro-

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credentials by highlighting the disruptive nature of this phenomenon, particularly in its unbundling effect on traditional education systems.

The challenge highlighted by (Ivancheva et al., 2020) and Steel et al. (2022) is that the current trend of institutions considering the 'unbundling' of their offerings—selling only specific components may hinder the ability to provide holistic micro-credential programs. A holistic micro-credential program would typically encompass a well-rounded set of skills, knowledge, and experiences relevant to a specific field or discipline. It might include various interconnected modules or courses that collectively contribute to a deeper and more thorough understanding of the subject matter. The challenge arises when institutions focus on unbundling, potentially leading to fragmented or isolated micro-credentials that do not offer a comprehensive educational experience.

Lack of standardization

Micro-credentials lack may lack standardization. Porter (2021) contend that in contrast to established qualifications like degrees, which adhere to certain international frameworks, the emerging field of micro-credentials lacks such standardized guidelines. and may or may not carry certification from an accrediting body or organization.

Resei et al. (2019) acknowledge that, in addition to low standardization, chaotic terminologies, and limited stackability and transferability, hinder the value and recognition of micro-credentials. Oliver (2019b) emphasizes that the most critical issue is the need to establish validating frameworks. (Steel et al., 2022) point out that unlike traditional education, where qualification systems are well-defined, micro-credentials are in a more uncertain state. Questions arise regarding how learners can ascertain whether their learning will be acknowledged by employers on a regional, national, or international level. Additionally, there is uncertainty about whether learners can stack micro-credentials to pave the way for future studies. Moreover, concerns persist about how employers and other institutions can determine the validity and trustworthiness of specific micro-credentials, ensuring that the duration and effort invested align proportionately with the earned credit (Steel et al., 2022).

Low Awareness and Understanding

While micro-credentials have numerous benefits, there is a general lack of awareness and understanding about what micro-credentials entail (Resei et al., 2019). The limited awareness and understanding of micro-credentials could hinder their adoption and utilization in educational and professional contexts. Without clear comprehension of their benefits and value, stakeholders may hesitate to invest in or recognize micro-credentials, potentially limiting opportunities for skill development and career advancement. Addressing this challenge through increased education and awareness efforts is essential to unlock the full potential of micro-credentials and ensure their integration into lifelong learning and workforce development initiatives.

7.0. Solutions to Address the Challenges Above

The advent of Industry 4.0 technologies has transformed job skill requirements, prompting global companies to introduce short courses with credentials equivalent to full Bachelor's degrees for recruitment purposes (Brown & Nic-Giolla-Mhichil, 2022). Furthermore, there is increasing emphasis from higher education institutions, quality assurance authorities, and government policymakers on the integration of micro-credentials into higher education (Wheelahan & Moodie, 2022).

Establishing robust quality assurance methods helps maintain the integrity and reliability of the credentials, instilling confidence in their value among stakeholders. Engaging stakeholders in collaborative design processes not only fosters buy-in and support but also ensures that the micro-credentials align with industry standards and expectations. Enlisting advocates for change within the organization can facilitate smoother implementation and acceptance of the micro-credential programs. Thoughtfully designing curriculum and assessment methodologies ensures that the credentials accurately reflect the skills and competencies acquired by learners, further enhancing their credibility. Finally, assessing delivery platforms and badge issuance technologies for

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compatibility and transferability on a global scale reinforces the credibility of micro-credentials by ensuring their recognition and portability across different contexts and jurisdictions.

According to (Tan. F, 2023), allocating dedicated time to pursue micro-credentials is paramount. This necessitates a long-term commitment from both employers and learners to collaborate on establishing the flexibility and hours required to acquire these skills, as micro-credential attainment often spans several years to stack towards a degree. Additionally, Tan. F (2023) stresses the importance of collaborating with employers and industry bodies to identify skill gaps within their respective industries. Varadarajan et al. (2023) acknowledges the pivotal role of stakeholder interaction in shaping the future trajectory of micro-credentials, with higher education institutions serving as a central nexus for all involved parties.

Institutions need to be dynamic in their teaching methodologies**.** Institutions need to realize that we are a changing world. In response to the dynamic technological advancements shaping contemporary education, Tan. F (2023) contend that in today's ever-changing world, where everything, including technology, is always changing and the younger generation is tech-savvy, universities should update their teaching methods to support students more effectively. Since jobs are evolving rapidly, it's crucial for working individuals to stay updated, allowing them to generate fresh ideas and tackle new challenges.(Tan. F, 2023) adds that in the digital age, instant communication has become the norm, shaping the expectations of younger generations. Traditional lengthy lectures are less effective due to shortened attention spans and abundant online resources. Emphasizing higher-order thinking, an interactive, asynchronous learning approach is favored. Micro-credentials, offering flexible learning anytime, anywhere, align well with this evolving educational landscape.

Conclusion

Micro-credentials provide a transformative opportunity for higher education institutions to address the changing demands of the workforce and close the skills gap among graduates. Their adaptability, accessibility, and industry-aligned focus equip students with targeted, market-relevant skills that traditional degree programs frequently fail to provide. Educational Institutions can create strong pathways for career advancement and skill development by integrating micro-credentials into their academic programs, fostering industry collaborations, leveraging on technological advancements, and addressing challenges such as awareness and standardization. Finally, the strategic use of micro-credentials improves employability while also reinforcing the importance of higher education in a rapidly changing global economy. This innovative approach is critical for preparing students to thrive in the 21st century workforce while also encouraging adaptability and lifelong learning.

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