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Mahlasela, Oyena Nokulunga and Steyn, Adriana A., "Benefits of adopting micro-credentials for skills development" (2023). *African Conference on Information Systems and Technology*. 10.
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Benefits of adopting micro-credentials for skills development

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ABSTRACT

Micro-credential providers are increasing both in diversity and volume. However, employers are still concerned about their role in skill development. This study aimed to understand how micro-credentials can assist employees in skills development. A systematic literature review was conducted for studies published between (2016 to 2023). Thirty-two sources were included in the final review. After that, five recommendations for employers when adopting micro-credentials were constructed first by (1) defining the value of formal and informal education. (2) exploring micro-credentials as a tool for skills development. (3) encouraging organisations to collaborate with other institutions. (4) encouraging continuous personalised learning, known as lifelong learning. Finally, (5) acknowledging the skills acquired by employees through micro-credentials. Therefore, lifelong learning can assist the workforce in preparing for rapid technological developments.

Keywords (Required)

Micro-credentials, digital badges, reskilling, skills development, lifelong learning.

INTRODUCTION

Reskilling and upskilling employees has been a problem for decades. However, the earlier workforce transformation was slower than currently experienced (Illanes, Lund, Mourshed, Rutherford & Tryeman, 2018). The previous workforce had the opportunity to allow older employees to retire while allowing new employees to grow in the industry and acquire relevant skills (Illanes et al., 2018;). Currently, the digital revolution is transforming the work environment and its business processes at an accelerating rate, triggering the implications for reskilling and upskilling the workforce (Shirani, 2019). These technological changes can result in organisations upgrading their infrastructure, hiring experienced workers with the appropriate skill set (Reilly, 2018), and forcing current employees to register for additional degrees or certifications to learn these new technologies (Chakma & Chaijinda, 2020).

The shift in skill sets for future work also drives the change in many job roles (Fung, 2020). For example, businesses cannot disregard technology such as Artificial Intelligence, which has recently gone mainstream (Hutchinson, 2023; Sebastian, 2023). The literature predicts various applications of these technological tools in business. For instance, e-commerce companies that rely on customer service for success can use generative AI to quickly respond to customer enquiries without having to hire additional personnel (George & George, 2023). Other businesses may integrate the use of these generative AI technologies to generate reports, conduct market analysis, code product offerings, or simply create a company website (Hutchinson, 2023; Haleem, Javaid, & Singh, 2023). In addition to this, the adoption of technologies such as Artificial Intelligence will also impact the way work is done, products are developed, and the way businesses interact with customers (Fung, 2020; Illanes et al., 2018; Shirani, 2019; Haleem, Javaid & Singh, 2023). Therefore, it can be said that the adoption of these disruptive technologies will bring about transformation and expansion of the range of tasks that involve repetition, problem-solving, and collaboration (Seet et al., 2018).

Then again, employers have different opinions when it comes to training employees. Some employers agree that training is required for these new technologies, but some do not prioritise training their workforce (Shirani, 2019). When considering some technologies, other employers are uncertain about which skills are needed and how training should be conducted (Seet et al., 2018; Ross, Bhandari, & Arslan, 2023). Therefore, skill development solutions are still needed for future work, and micro-credentials may assist in providing employees with the necessary skill set. Rimland and Raish (2019) define micro-credentials as virtual, portable learning and skills that are acquired granularly. To date, the implementation and use of micro-credentials or digital badges have evolved in the past few years. Currently, digital badges are more complex, as they contain metadata to validate the skills acquired, for example, information about the issuers, knowledge earned, and activities undertaken for achieving the badge, just to name a few (Gibson, 2015; Newby & Cheng, 2019; Rimland, 2019; Trepulè et al., 2021; Wolz, 2021).

This evolution encourages the new development of digital badges and endless opportunities for their application in various sectors (Rimland, 2019; Rottmann & Duggan, 2021). However, most studies support the view of micro-credentials as a tool to develop skill sets (Calonge, Shah, Riggs & Connor, 2019; Copenhaver & Pritchard, 2017; Gauthier, 2020; Lim et al., 2018). There is, however, little evidence to confirm the increase of micro-credentials for skill development in the work environment (Calonge et al., 2019; Gibson, 2015). Gauthier (2020) described that some modern employers prefer to hire capable and experienced employees rather than inexperienced graduates with a university degree. This may raise the question of what will happen to students who graduate from higher education each year. It is then worth exploring to what extent these micro-credentials can assist in tackling skills

shortage and upskilling the current workforce, ultimately creating lifelong learning opportunities for earners (AACSB, 2018).

RESEARCH METHOD

A systematic literature review was conducted to find relevant literature. The research question was to determine, “*What benefits can organisations use to adopt micro-credentials when reskilling their workforce?*”. The search procedure adheres to the Preferred Reporting Items for Systematic and Meta-Analysis (PRISMA) framework for publications written between (2016- 2023). The following search term (“micro-credentials” OR “digital badges” OR “MOOC” AND “skills development” OR “reskilling”) was used for ACM, Science Direct and the Scopus database for comprehensive results (Appendix B). For the selection criteria, inclusion and exclusion criteria were applied.

Table 1 The inclusion and exclusion criteria

Inclusion	
Date	Include research papers dated 2016 to 2023 for convenience.
Study Design	Include only research papers that performed qualitative research studies.
Publication Type	Include journals, e-books, reports, and conference proceedings.
Setting	Include papers from both the higher education and the workplace environment.
Exclusion	
Language	Exclude research papers that are not written in English.
Duplicates	Exclude duplicates of the same article found in different databases.
Relevance	Exclude irrelevant research papers unrelated to micro-credentials or digital badges and reskilling.
Accessibility	Exclude research papers that cannot be accessible.

FINDINGS

Data Extraction and Analysis

The search yielded 756 sources, but only 32 were included in the final review. Five theme patterns were identified and coded in (Appendix B) The theme included skills gap, employee growth, employee recognition across sectors, employee collaboration, and flexible learning. The publications selected for this study focused specifically on using micro-credentials in reskilling employees. The adoption of micro-credentials in the workplace will provide companies with the opportunity to upskill and reskill their workforce in the following ways.

Bridging skills gap

Bridging the skills gap and employability remains a critical challenge in the workplace (Paulet et al., 2020). Caratozzolo et al. (2021) mention that skill obsolescence is expected as technology progresses and jobs become more complex and demanding. However, that is not the only case; the other problem is the increased demand for heterogeneous jobs (Bate, 2018). Heterogeneous jobs are interdisciplinary and applicable in multiple fields (Paulet et al., 2020). For example, a cybersecurity specialist can work in various fields, such as accounting, law, government, and the private sector (Bate, 2018; Paulet et al., 2020). Thus, technological improvements will not only affect skills gaps, but it will also change job requirements as technology advances (Paulet et al., 2020). Therefore, as disruptive technologies enter the workplace, the job market is changing and eventually changing the employers' expectations (Gauthier, 2020). Gauthier (2020) mentioned that modern employers were questioning the validity of

university degrees. However, Caratozzolo et al. (2021) suggested that the validity of educational products should not be determined only by employers and accreditation agencies. For even highly skilled workers face decreased productivity due to technological changes in the workplace (Caratozzolo et al., 2021; Poullet et al., 2020). However, bridging the skills gap should involve collaboration between employers, employees (learners), providers, and policymakers (Zain, 2023; Oliver, 2019; Gallagher, 2018). The agreed premise is micro-credentials (Acree, 2016; Berry & Byrd, 2019; Gauthier, 2020; Selvaratnam & Sankey, 2021). Micro-credentials can offer trustworthy qualifications in the domain of technical skills, business skills, and power skills (Poullet et al., 2020).

While employers seek skilled workers, employees are looking for ways to learn these skills to meet the demand (Gauthier, 2020). Poullet et al. (2020) state that businesses should instead focus on reskilling current employees to increase productivity and gain a competitive advantage. Likewise, employees can customise micro-credentials to meet their learning outcomes (Lim et al., 2018). Therefore, micro-credentials can be used for personal and professional development to remain relevant in the workplace (Lim et al., 2018; Oliver, 2019; Poullet et al., 2020). Furthermore, providers are also one of the significant stakeholders in providing quality resources that will assist employers in reskilling or upskilling their employees (Oliver, 2019). Providers may include traditional universities, private providers, and employers offering retraining (Oliver, 2019). Therefore, HEIs must collaborate with companies to provide learning to help close the skills shortage (Gauthier, 2020; Poullet et al., 2020).

Encouraging employee growth

The concept of upskilling and reskilling to measure up to technological capabilities sets a new set of educational goals (Poullet et al., 2020). Thus, obtaining micro-credentials could motivate employees to continuously engage with online learning designed to assist them in achieving their educational objectives (Oliver, 2019). Furthermore, Copenhaver and Pritchard (2017) mentioned that integrating micro-credentials into a company's training programme could offer an innovative and customised way of certifying and recognising employee learning. Lim et al. (2018) stated that employees who acquired new skill sets through micro-credentials will stand out compared to their peers. Additionally, earning micro-credentials can be seen as a signpost since, after receiving a digital badge, an employee will be provided with information about further learning opportunities (Gauthier, 2020; Calonge et al., 2019). Since each digital badge contains information about the learners' achievements, it can guide the user to the next set of skills to achieve their educational goals (Copenhaver & Pritchard, 2017). Moreover, because micro-credentials are sharable, employees can share them on other online platforms to showcase their new skill set (Lim et al., 2018).

Recognition across sectors

Acquiring a digital badge provides the earner with the opportunity for personal and skill development (Lim et al., 2018). For skill development, an employee will be offered the chance to respond to the needs of an organisation (Baiocco et al., 2020). Furthermore, when micro-credentials are viewed as a form of accreditation and validation of skills, employees will be recognised across different sectors for acquired skill sets (Kato et al., 2020). Therefore, earning a digital badge can be a virtual representation, allowing employees to formalise their reputation within and across industries (Copenhaver & Pritchard, 2017; Poullet et al., 2020). Receiving a digital badge is the reflection of accreditation that reflects work of accomplishment, not just passing a test (Wilson et al., 2016). Thus, micro-credentials can present employees' achievements in a user-centric, transparent and effective way to showcase skills attained (Baiocco et al., 2020; Brown et al., 2021; Kato et al., 2020). Therefore, the endorsement of the digital

badge by the external organisation to publicly license the value of the badge is essential (Everhart et al., 2016). Hence, for micro-credentials to be considered valuable, they need to be assessed and verified (Resei et al., 2019). However, some computer systems come with predefined badges that allow organisations to personalise their badges to be aligned with the organisational culture (Lim et al., 2018)—for example, the Learning Management System (LMS) such as Moodle or Blackboard.

Foster collaboration between employees

Adopting micro-credentials in the workplace can foster collaboration between employees. Information embedded in a digital badge does not only show badge competency (Copenhaver & Pritchard, 2017). But, it can also enable companies or human resources administrators to include badges for the ranking and promotion process (Hamson-Utley & Heyman, 2016). Acree (2016) mentions four elements needed when developing micro-credentials, which include:

- *Self-Directed*- Employees should be able to complete micro-credentials at their own pace (Acree,2016).
- *Job-embedded*- Implies that each credential should be directly aligned or to enhance the skills required for the employee’s job (Acree,2016).
- *Competency-Based*- This means the micro-credentials earned by an employee should demonstrate their ability for a particular skill at work (Hunt et al., 2020).
- *Research-Based*- This means that micro-credentials should be designed around skills that have been researched and that show impact on the work practice (Acree, 2016).

Other studies shared more elements to be considered for micro-credential development.

- *Sharable*- Employees should be able to share micro-credentials across many platforms (Msweli et al.,2022).
- *Accredited and recognised*- This refers to micro-credentials being formally recognised in the education sector like a formal degree or by professional practitioners like a Microsoft certification (Msweli et al., 2022).

Oliver (2019) further suggests that the endorsement of micro-credentials by employers is essential, for it can encourage employees to include micro-credentials in their work experience as a tool for promotion or a chance to network with other employees (Oliver, 2019). Therefore, the micro-credential design should allow users to engage and exchange ideas and experiences (Berry & Byrd, 2019; Oliver, 2019).

Continuous and flexible learning

Micro-credentials offer an agile approach to learning. To earn a micro-credential, employees must register by selecting the relevant credential, which can be from a university (as a provider) or private external providers (Lim et al., 2018). After that, take the course, write an assessment, and receive the digital badge as proof of the credential earned (Rossiter & Tynan, 2019; Ehlers, 2018). Then, the digital badge received after completing the credential should be shareable to other online platforms (Brown, Mhichil, Beirne & Mac Lochlainn, 2021). Furthermore, it is essential to note that the delivery of these credentials varies from hours to weeks or even months (Msweli et al., 2022). Therefore, employees will be able to participate in continuous lifelong learning experiences.

RECOMMENDATIONS FOR ADOPTING MICRO-CREDENTIALS FOR SKILLS DEVELOPMENT

1: Clearly define the value or policy of formal and informal education

The organisation's perception of micro-credentials is essential to address the lack of awareness and understanding of their value in skills development (Resei et al., 2019; Brown et al., 2021). Some employers perceive micro-credentials as interest-driven informal certification (Fishman et al., 2018). Therefore, the following recommendations can be made: *Awareness campaigns*, organisations can launch online education as a form of awareness for employees, as micro-credentials provide continuous learning, contrary to a full degree (Oliver, 2019; Rossiter & Tynan, 2019). This will encourage employees to enrol in the courses of interest to develop job-embedded skill sets (Acree, 2016). Secondly, to *draft a clear accreditation policy*, the organisation can formulate and list the skill set that can be achieved through micro-credentials and include the skill set that requires formal traditional education. This can assist employees to register for competency-based learning recognisable to their industry (Resei et al.; Acree, 2016). Furthermore, employers need to understand the different types of credentialing and decide which suits their organisation's needs when reskilling.

2: Explore micro-credentials as a tool for reskilling

Changes in technology require workers to acquire new skill sets continuously. Therefore, micro-credentials can allow employees to access (just-in-time) new content in response to technological demands. As Crow (2016) stated, micro-credentials will offer access to learning options because of the expansion of opportunities available. This can also lead to multiple opportunities to overcome the challenges provided by previous training programmes (Copenhaver & Pritchard, 2017). Additionally, the other attractive aspect of micro-credentials is that many of them require no prerequisite skill set or education to enrol, giving anyone who wants to learn a new skill (Acree, 2016; Calonge et al., 2019; Wolz et al., 2021). Exploring micro-credentials as a tool for reskilling can also save organisations money compared to the money they can spend on a full degree since they offer short courses, unlike a full degree that can take years to complete.

3: Collaborate with other institutions.

Reskilling and upskilling the workforce should be a collaborative effort (Hunt et al., 2020). Employers should play a vital role in the development of current and future employees (Copenhaver & Pritchard, 2017). Therefore, their collaboration with Higher Education Institutions (HEI), the government, and other micro-credential providers can motivate employees to enrol for different digital badges (Oliver, 2019). This may result in retaining employees with relevant skill sets (Kato et al., 2020). Furthermore, collaboration also introduces cross-pollination of knowledge from the perspective of external entities and allows companies to brainstorm new ideas to improve their businesses (Copenhaver & Pritchard, 2017; Resei et al., 2019). Resei et al. (2019) further state that this can improve the company's branding, increase visibility, and create a good reputation with the open public. Through collaboration with HEI, employers can ensure that universities offer work-related learning (Oliver, 2019).

4: Encourage continuous personalised learning

It is also important to note that micro-credentials are not a one-size-fits-all solution (Trepule et al., 2021). Instead, they are designed to foster personalised learning (Acree, 2016). Digital credentialing providers and endorsers should consider record standards and learning outcomes that communicate to

recipients what is required and how it can be achieved (Lim et al., 2018). The focus goal in micro-credential courses should be to give individuals an improved learning experience and provide consistent feedback (Resei et al., 2019). Thus, for more personalised learning, employees can:

- Complete micro-credentials at their own pace and time (Acree, 2016).
- Set their goals to attain job-embedded competency-based learning (Acree, 2016; Msweli et al., 2022).
- Select the preferred reputable provider for each module learning outcome (Lim et al., 2018).

Moreover, employees will benefit from registering micro-credentials since they are frequently delivered online (Msweli et al., 2022). Therefore, geographic location should not be a problem, and this can foster long-life learning (Hunt et al., 2020).

5: Acknowledge the skills acquired by the employees

For employees, the drive to learn can be intrinsic or extrinsic motivated, but frequently, it is intentional to achieve a particular goal (Conrad & Openo, 2018). Understanding competency, which can be observed as the employee's ability to apply learnt (knowledge) in their field of work (Kostin & Weafer, 2017), can assist in acknowledging that registering for a micro-credential is a strategic move to expand learning options and gain recognition in the work field (Baz, 2018). Most researchers agree that micro-credentials offer competency-based learning (Acree, 2016; Baiocco et al., 2020; Crow, 2016; Everhart et al., 2016; Gauthier, 2020); Gunn, 2017; Msweli et al., 2022). Therefore, adopting micro-credentials for reskilling or upskilling creates the opportunity for growth and recognition of skills achieved for professional development (Trepulè et al., 2021). Furthermore, the information embedded in the digital badges supports users in defining their learning pathways and acts as visible proof in the digital platform (Gibson et al., 2015; Gunn, 2017; Trepulè et al., 2021). Therefore, employers should acknowledge the skill set achieved by each employee through micro-credentials.

CONCLUSION

The main objective of this study was to understand how micro-credentials can assist employers in reskilling or upskilling the credibility of their workforce in the work environment. A systematic literature review assisted in identifying the adoption of micro-credentials in the work environment. This study discussed the benefits employees can achieve by adopting micro-credentials for skill development. The benefits included bridging the skills gap, encouraging employee growth, earning recognition across different sectors, promoting collaboration, and encouraging continuous and flexible learning. Furthermore, this study provided five recommendations that organisations can use to adopt micro-credentials to reskill the workforce. (1) clearly define the value of formal and informal education, (2) explore micro-credential as the tool for reskilling or upskilling, (3) collaborate with other institutions, (4) encourage continuously personalised learning, and (5) acknowledge the acquired skills by employees through micro-credentials.

APPENDIX A

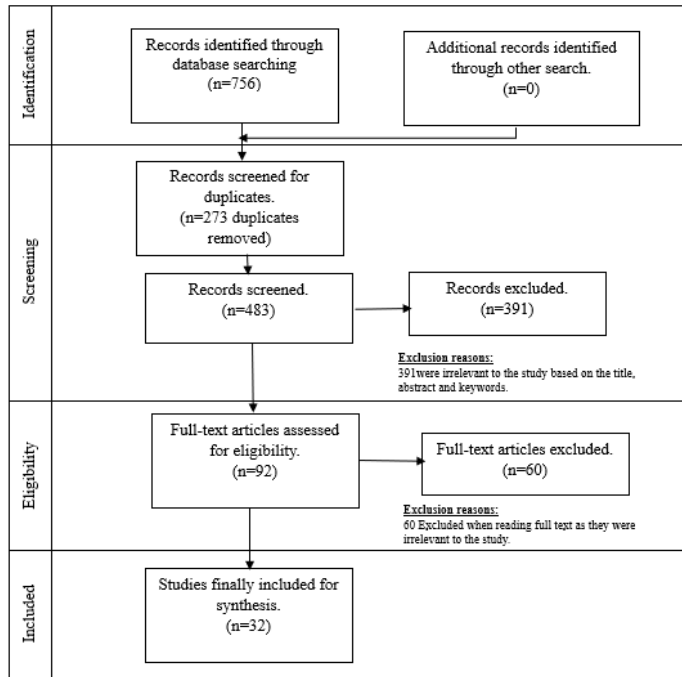


Figure 2 The PRISMA flow chart

APPENDIX B

Code legends

[SG]- Skills gap -[EG]- Encouraging employee growth -[ER]- Employee Recognition across sectors- [EC]- Employee collaboration -[FL]- Flexible Learning

#	Authors	Benefits to the Employee Coding
[1]	Acree, L. (2016)	[SG] [EC] [FL]
[2]	Baiocco, S., Simonelli, F., & Westhoff, L. (2020)	[SG] [ER]
[3]	Berry, B., & Byrd, P. (2019)	[SG] [EC]
[4]	Borrás-Gené, O. (2018)	[SG] [ER] [FL]
[5]	Brown, M., Mhichil, M. N. G., Beirne, E., & Mac Lochlainn, C. (2021)	[SG] [EG] [FL]
[6]	Calonne, D. S., Shah, M. A., Riggs, K., Connor, M., & Wang, S. (2019)	[SG] [FL] [ER] [EG]
[7]	Copenhaver, K., & Pritchard, L. (2017)	[EG] [EC]
[8]	Crow, T. (2016)	[SG] [FL]
[9]	Ehlers, U.D. (2018)	[FL]
[10]	Everhart, D., Derryberry, A., Knight, E., & Lee, S. (2016).	[ER] [FL]
[11]	Gallagher, S. (2018)	[SG] [EG] [ER] [FL]
[12]	Gauthier, T. (2020)	[SG] [EG] [ER] [EC] [FL]
[13]	Gunn, C. (2017)	[FL]
[14]	Hamson-Utley, J., & Heyman, E. (2016).	[EC]
[15]	Hunt, T., Carter, R., Zhang, L., & Yang, S. (2020).	[FL] [EC]
[16]	Illanes, P., Lund, S., Mourshed, M., Rutherford, S., & Tyreman, M. (2018)	[SG]
[17]	Kato, S., Galán-Muros, V., & Weko, T. (2020)	[SG] [FL]
[18]	Kostin, M., & Weafer, D. (2017)	[SG] [FL]
[19]	Lim, C. L., Nair, P. K., Keppell, M. J., Hassan, N., & Ayub, E. (2018)	[SG] [EG] [ER] [FL]
[20]	Msweli, N. T., Twinomurizi, H., & Ismail, M. (2022).	[SG] [EG] [ER]
[21]	Newby, T. J., & Cheng, Z. (2019)	[EG]
[22]	Oliver, B. (2019)	[SG] [EC] [FL] [ER] [EG]
[23]	Paullet, K., Behling, D., & Behling, R. (2020)	[SG] [EG] [FL]
[24]	Resei, C., Friedl, C., Staubitz, T., & Rohloff, T. (2019)	[SG] [FL] [EC] [EG]
[25]	Rimland, E., & Raish, V. (2019)	[FL] [SG] [EC]
[26]	Rossiter, D., & Tynan, B. (2019)	[FL] [SG]
[27]	Rottmann, A. K., & Duggan, M. H. (2021).	[SG] [FL]
[28]	Selvaratnam, R. M., & Sankey, M. (2021)	[SG] [FL] [EC]
[29]	Trepulė, E., Volungevičienė, A., Teresevičienė, M., Greenspon, R., & Costa, N. (2021)	[ER] [FL]
[30]	Wilson, B. G., Gasell, C., Ozyer, A., & Scrogan, L. (2016)	[FL] [SG]
[31]	Wolz, E., Gottlieb, M., Pongratz, H. (2021)	[FL] [SG]
[32]	Zain, S. (2023)	[SG] [ER] [EC] [FL]

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