



Exploring the Potential of Micro-credentials and Digital Badging: An Annotated Bibliography

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Introduction

This annotated bibliography provides brief summaries of previous literature on micro-credentials (also termed stackable credentials, nanodegrees, microdegrees, short learning degrees, micro-certifications & short courses) and their impact across different sectors, specifically academic, employer, alumni and other students. The reports, studies and articles found in this bibliography are issued from current literature on the topic, ranging from 2015 to 2021.

Annotated Bibliography

1 Bailey, Thomas R., and Clive Belfield. (2017). 'Stackable Credentials: Awards for the Future?', CCRC Working Paper No. 92, Community College Research Center, Teachers College, Columbia University, Available from: <https://ccrc.tc.columbia.edu/media/k2/attachments/stackable-credentials-awards-for-future.pdf> [Accessed 19/07/2021]

This study demonstrates the benefits, challenges and potential of stackable credentials. Stackable credentials are defined as 'sequential postsecondary awards that allow individuals to progress on a career path' and they aim to help bridge the gap between skill demand and skill supply. There is interest in implementing more of these stackable credentials into the education system as they would create opportunities which would reduce job displacement. There are three types of stackable credentials: progression, supplemental, and independent which can be used in different settings, such as the labour market or accessing a degree. This paper sheds light upon the benefits micro-credentials would bring to students as well as employers.

2 Buckwalter, Veronica. (2017). 'Four ways to increase the value of short-term credentials. Jobs for the Future', A Guide for Community Colleges, JFF, Lumina Foundation, Available from: https://jfforg-prod-new.s3.amazonaws.com/media/documents/A_Guide_for_Community_Colleges-SB-101618.pdf [Accessed 19/07/2021]

This source intends to find a way to increase the value of short-term credentials through the use of micro-credentials and other short credentials. This report points out the barriers to micro-credentialing (inconsistent language, low industry awareness and an unregulated system), however describes their benefits, such as advancing one's career and gathering specialised knowledge and experience that is researched by companies. Through a comparative chart of three types of credentials, this resource recognises the criteria of a high quality credential : industry recognised, portable, stackable, third-party validated, demand-driven, flexible and transparent. The author of this document is a senior program manager at JFF, an American non-profit that designs innovative solutions to create access to economic advancement. This guide successfully recommends to colleges how to develop credentials that employers need and explain why these employers have difficulties accepting these short credentials.

3 Chakroun, Borhene, and Keevy, James. (2018). 'Digital credentialing: Implications for the recognition of learning across borders', Open Educational Resources repository network for Nigeria Open Schooling Project, Document code:ED-2018/WS/29, UNESCO, Available from: <https://unesdoc.unesco.org/ark:/48223/pf0000264428> [Accessed 19/07/2021]

This report offers a critical assessment of digital credentialing and argues that there is a need for international reference standards to be able to recognise skills and qualifications globally. The authors explore how digital technologies can lead to a more transparent

recognition of transferable skills and qualifications and how this can be beneficial to students and employers. The report concludes that without commonly agreed digital metadata regulations or an international label, micro-credential recognition cannot progress. This report successfully explores the need for partnership, collaboration and raising awareness for these issues for micro-credentials to develop into fully functioning and beneficial qualifications.

4 Devedžić, Vladan and Jovanović, Jelena. (2015). 'Developing Open Badges: a comprehensive approach', Education Tech Research Dev 63, pp. 603–620. Available from: <https://doi.org/10.1007/s11423-015-9388-3> [Accessed 19/07/2021]

This paper provides a comprehensive framework of open badges by examining their benefits, concerns and challenges from the perspectives of different stakeholders: learners, teachers, employers and other institutions or associations. This report demonstrates how micro-credentials and digital badges can motivate learners to remain engaged with their studies, all the while providing them with significant freedom and flexibility over their own learning and career path. These short credentials allow employers to recognise suitable candidates by accessing their specific skills acquisition, visible through micro-credentials and digital badges that would often be overlooked by traditional entities such as universities. This report also speaks of the value of stacking these credentials to promote oneself to employers. Therefore overall, employers and students can benefit greatly from the implementation and uptake of micro-credentials.

5 Ehlers, Ulf-Daniel, et al. (2018). "Support Learning through Microcredentialling—The Case of the MicroHe Initiative." Exploring the Micro, Meso and Macro – EDEN Annual Conference Proceedings, 2018, Genova ISBN 978-615-5511-23-3 EDEN Conference Proceedings. No. 1. Available from: <https://www.eden-online.org/proc-2485/index.php/PROC/article/view/1592/1300> [Accessed 19/07/2021]

This report depicting MicroHE's involvement in the development of micro-credentials, contributes to mapping out the micro-credentials ecosystem and encouraging their uptake to promote lifelong learning and flexible education. Digital badges and open badges are a way to recognise individuals' skills and experience and showcase them to future employers. Through the badging system associated to micro-credentials the needs of educational institutions, students and employers would be met. The MicroHE initiative has however been confronted with challenges such as ethical and technical issues that raise questions on trust, data and privacy. This report depicts accurately the benefits and challenges of micro-credentials in the academic and employment worlds.

6 Ellis Larry, Nunn Sandra and Avella John. (2016). 'Digital Badges and Micro-credentials: Historical Overview, Motivational Aspects, Issues, and Challenges', In: Ifenthaler D., Bellin-Mularski N., Mah DK. (eds) Foundation of Digital Badges and Micro-Credentials. Springer, Cham. Available from: https://doi.org/10.1007/978-3-319-15425-1_1 [Accessed 19/07/2021]

This article explores motivational aspects, challenges and benefits of digital badges and micro-credentials in the modern world, exploring them through empirical evidence of digital badge utilisation. Digital badges are described as opportunities to recognise various learning pathways, individual competencies and experience beyond traditional education systems. Once again they show the potential to fill the gap between the broad undergraduate degree and the specific skills and competencies that are being researched by employers. This report highlights the possibility for lifelong learning and continuous professional development through these new technological credentials.

7 European MOOC Consortium, FutureLearn, France Université Numérique (FUN), OpenupEd, Miriadax, and EduOpen. (2019). 'The European MOOC Consortium (EMC) launches a Common Microcredential Framework (CMF) to create portable credentials for lifelong learners', Available from <https://epale.ec.europa.eu/en/content/emc-launches-common-microcredential-framework> [Accessed 19/07/2021]

This collaboration focuses on the confusion created by the proliferation of terminology related to micro-credentials. This collaboration's aim is to launch a micro-credential framework that would ensure consistency, quality and portability. The main issue preventing micro-credentials to thrive is the lack of trust or credibility from the universities and the employers, due to this confusion within the micro-credential ecosystem. This collaboration then aims to increase awareness, implementation and visibility of micro-credentials as well as close the knowledge and skills gap in the economy for workers. Overall, the main issue slowing the process of micro-credential implementation within society is the lack of communication between the different sectors, creating conflicting and confusing information.

8 Fishman, Barry, Teasley, Stephanie, and Cederquist, Steven. (2019). Beyond Transcripts and GPAs: An NSF Workshop on Digital Micro-credentials for Use in College Admissions. In Rapid Community Report Series. Available from: <https://repository.isls.org/handle/1/1762> [Accessed 19/07/2021]

The purpose of this resource was to explore the potential of digital micro-credentials (and digital badges) as a part of the college admissions process. A workshop was conducted which resulted in finding evidence that micro-credentials could be an effective method proven to prevent under- matching, connect students to new educational opportunities as well as create more accessibility to specific studies for all. The challenges they found in their research showed the need for equity, validity & endorsement, agency & authenticity, promoting lifelong learning, infrastructure and scalability in order for micro-credentials to have a lasting effect on the educational sector. This report demonstrates the benefits of micro-credentials for students from outside university or higher education programmes or within them to have access to a subsequent education level.

9 Ahmed, Dalal and Jassim, Ghada, (2021) 'Micro-credentials Life & Employability Skills: Evaluating Students' and Teachers' Attitudes Towards Implementing Micro-credentials in Higher Education', Proceedings of the AUBH E-Learning Conference 2021: Innovative Learning & Teaching - Lessons from COVID-19, Available from: <https://ssrn.com/abstract=3874884> or <http://dx.doi.org/10.2139/ssrn.3874884> [Accessed 19/07/2021]

This research explores a study on student and teacher points of view on the implementation of micro-credential courses within higher education institutions. The aim of these micro-credentials is to support students in a post-pandemic job market by providing them with necessary life and employability skills that are relevant to the modern ever-changing market. A survey research method was used to discover that students had positive attitudes towards micro-credentials and perceived their benefits. The findings also demonstrated teachers' interest in micro-credentials, despite their lack of knowledge on the skills required on the modern job market. Overall, the aim is to raise awareness to the importance of early integration of micro-credentials in order for students to have access to new career prospects that match the post COVID-19 competitive labour market.

10 Gauthier, Thomas. (2020) The value of microcredentials: The employer's perspective. Competency-based Education, The Journal of Competency-Based Education , Western Governors University, Available from: <https://doi.org/10.1002/cbe2.1209> [Accessed 19/07/2021]

This resource seeks to understand the employer's perspective on the value of micro-credentials. It is discovered that employers perceive a disjointed correlation between qualifications and skills, therefore there is a need and desire for a micro-credentialing structure as this would create transparency between the candidates (students) and the employers. The general consensus is that micro-credentials would be beneficial to the holders and the employers however a registry and governing rules would be necessary to increase and protect the value of these credentials. The author Gauthier is an expert on the subject, as he specialises in postsecondary career, employability amongst other subjects within the Department of Trade and Industry at Palm Beach State College. The validity and reliability of the study give weight to its findings.

11 Giani, Matthew, and Fox, Heather Lee. (2017). 'Do stackable credentials reinforce stratification or promote upward mobility? An analysis of health professions pathways reform in a community college consortium', *Journal of Vocational Education & Training*, 69:1, 100-122, Available from: <https://doi.org/10.1080/13636820.2016.1238837> [Accessed 19/07/2021]

The aim of this study is to determine whether or not stackable credentials are beneficial to their earners in the long-term. The findings show that despite the concerns, the students who accumulated short or very short credential programs were subsequently accessing longer qualifications. However, there is evidence of racial disparities and limited labour market value in regards to certain short-term credentials, therefore it is still arguable whether these types of micro-credentials are beneficial to all students. This study shows the many benefits of stackable credentials however, a need for closer analysis and further research is highlighted when discovering issues in regards to supply and demand of the economic market.

12 Hunt, Tiffany, Carter, Richard, Zhang, Ling and Yang, Sohyun. (2020). 'Micro-credentials: the potential of personalized professional development', *Development and Learning Organizations*, Vol. 34 No. 2, pp. 33-35. Available from: <https://doi.org/10.1108/DLO-09-2019-0215> [Accessed 19/07/2021]

The purpose of this article is to explore micro-credentials as innovative, personalised and professional development opportunities. Traditional education usually lasts several years and teaches few employability skills in comparison to micro-credentials. These have the ability to develop educator skills, provide relevant content, encourage flexibility, and measure earner experience. Although micro-credentials are relatively new, state leaders and administrators are researching their use to improve teaching practices in order to benefit individuals. The objective of this article is to encourage a change in educational systems which would align with new technologies and advancements.

13 Ifenthaler, Dirk, Nicole Bellin-Mularski, and Dana-Kristin Mah. (2016). "Foundation of digital badges and micro-credentials." *Demonstrating and Recognizing Knowledge and Competencies*, Springer International Publishing AG Switzerland, Available from: <https://link.springer.com/content/pdf/10.1007/978-3-319-15425-1.pdf> [Accessed 19/07/2021]

This volume compiles a collection of works and findings concerning micro-credentials and digital badges from multiple perspectives. These case studies and research findings shed light upon the practical experiences and challenges facing the learning experience of the twenty-first century. These challenges include motivation, learning, and instruction in all educational settings: K-12, higher education, workplace learning, and further education. This volume shows the potential of digital badges and micro-credentials as an alternative to traditional education. Micro-credentials support flexible learning pathways linking the worlds of education and employment. Digital badges bring visibility, transparency and recognise skills, experience and knowledge. However this is not possible without open, transferable and stackable technology.

14 Kato, Shizuka, Galán-Muros Victoria and Weko Thomas. (2020). "The emergence of alternative credentials", OECD Education Working Papers, No. 216, OECD Publishing, Paris, Available from: <https://www.oecd-ilibrary.org/docserver/b741f39e-en.pdf?expires=1626703262&id=id&accname=guest&checksum=3E146B479F28EBA31121496948818609> [Accesses 19/07/2021]

This paper aims to aid policymakers by defining common micro-credential terminology, establishing criteria, looking at providers and learners, and investigating employers' and governments' perceptions of these credentials. The benefits found within these alternative credentials are their ability to help learners acquire new skills, update their existing skills, and signal the competencies they already have as well as enabling reskilling and upskilling. However, the challenges encountered are employers' unfamiliarity with micro credentials, lack of standardisation, absence of validation and relative value. Once again, this paper aims to bring attention to the relations between employers and students which would be benefited by the use of micro-credentials.

15 Lim, Chee Leong; Nair, Pradeep Kumar; Keppell, Michael James; Hassan , Nurhanim and Ayub Enna. (2018). 'Developing a Framework for the University-Wide Implementation of Micro-Credentials and Digital Badges: A Case Study From a Malaysian Private University,' 2018 IEEE 4th International Conference on Computer and Communications (ICCC), pp. 1715-1719, Available from: 10.1109/CompComm.2018.8780706 [Accessed 19/07/2021]

This study aims to demonstrate the benefits that micro-credentials (and digital badges) would bring to the university system, in order to overcome the challenges of the evolving and increasingly competitive job market. Their main argument is that universities should collaborate and create partnerships with industries through the 'University Online Store', in which micro-credentials and digital badges would be accessible. The results from their study present the benefits of micro-credentials both to students and employers. The students would be able to stand out and market their skills and experience to employers, while the latter would hold immediate access to the evidence of these candidates' skills. Their leading argument is that for there to be successful continuous learning and personal development from the students, micro-credentials and digital badges need to be understood as early as possible in their education.

16 Morris, Neil; Ivancheva, Mariya; Coop, Taryn et al. (2020). 'Negotiating growth of online education in higher education'. Int J Educ Technol High Educ 17, 48 Available from: <https://doi.org/10.1186/s41239-020-00227-w> [Accessed 19/07/2021]

This study demonstrates the wide range of decision makers influencing the growth of online education within English universities. Using a modified form of PEST as an analytical tool this paper has focused on university partnerships with private and external organisations. The paper presents the challenges faced by universities including a need to remain regimented and respected whilst remaining accurate and active in this online credentialing environment. The aim of these institutional and educational changes are to attract interest from a wide range of private providers, including employers and new training providers and grant easier and more relevant access for students to employment.

17 Oliver, Beverley (2019). 'Making micro-credentials work for learners, employers and providers', Deakin University, [Melbourne], Available from: <http://dteach.deakin.edu.au/2019/08/02/microcredentials> [Accessed 19/07/2021]

This report aims to present a system in which micro-credentials and digital badges would work in the best possible way. This is said to be possible by creating an environment that is

built on trust, adding value and achieving sustainability. In this report, micro-credentials are described to be at the 'intersection of education and industry', as they aim to create upskilling and reskilling opportunities and accessibility for all. This report describes the necessary measures in order for micro-credentials and digital badges to thrive and benefit society: including partnership between providers, employers and policy makers, and again, trust, value and sustainability. This would be achieved through long term policy, investment, security and privacy. This comprehensive study explores these areas in depth through studying past literature, collecting data and analysing interviews and surveys.

18 Perkins, Joy, and Pryor, Mary. (2021). 'Digital badges: Pinning down employer challenges'. *Journal of Teaching and Learning for Graduate Employability*, 12(1), pp.24-38. Available from: <https://doi.org/10.21153/jtlge2021vol12no1art1027> [Accessed 19/07/2021]

This study demonstrates the benefits of digital badges for both students and employers through a mixed method study combining quantitative and qualitative data collection. This study focuses on employer perspectives and acceptance of micro-credentials and digital badges. The study finds that employers are unfamiliar with the terms and concepts relating to micro-credentials, however they express a strong desire to interact with them and see potential. They conclude that creating partnerships and collaborating between employers and accrediting institutions such as universities or colleges is vital for a functioning digital credential system.

19 Ratna Malar, Selvaratnam, and Michael, Sankey. (2021). 'An integrative literature review of the implementation of micro-credentials in higher education: Implications for practice in Australasia. *Journal of Teaching and Learning for Graduate Employability*, Deakin University. Available from: <https://files.eric.ed.gov/fulltext/EJ1293818.pdf> [Accessed 19/07/2021]

This paper draws its information from reviews of relevant literature in order to understand relations between universities and their desire to offer micro-credentials. The paper also uses the previous literature to understand the environment necessary for universities to be able to successfully implement micro-credentials. One of its primary goals is to create a basis on which a technical model of microcredentialing implementation would be built. This initial organisation would involve various stakeholders in order to design and evaluate these new micro-credentials. A crucial finding was the need to understand the contributions of each stakeholder, as fragmentation of micro-credential research creates barriers to steady progress.

20 Resei, Christoph, et al. (2019) "Micro-Credentials in EU and Global." Result 1.1c, Corship corporate edupreneurship, ERASMUS +. Available from: https://s3.xopic.de/openhpi-public/pages/research/27kLG703NBaxDqjuaNjOWe/Corship-R1.1c_micro-credentials.pdf [Accessed 19/07/2021]

This report's objective is to provide an overview of micro-credentials in the EU and globally. Through a qualitative approach and semi-structured interviews, the authors of this report find that micro-credentials are perceived as promising. They are found to improve lifelong learning and can provide an education equipped to the fast-changing labour markets, all the while staying personalised and tailored to individual needs. This report emphasises the need for the implementation of micro-credentials to be a complement to traditional education, unlike university staff's concerns that micro-credentials may replace these existing systems. The empirical data of this report states that there is immense potential for the use of micro-credentials in collaborative and co-creation settings, where companies and universities can offer blended formats.

21 Futures, Hanne Shapiro; Andersen, Tine and Larsen, Kristine Nedergaard. (2020). 'FINAL REPORT: A EUROPEAN APPROACH TO MICRO-CREDENTIALS', OUTPUT OF THE MICRO-CREDENTIALS HIGHER EDUCATION CONSULTATION GROUP, Luxemburg, Available from: <https://ec.europa.eu/education/sites/default/files/document-library-docs/european-approach-micro-credentials-higher-education-consultation-group-output-final-report.pdf> [Accessed 19/07/2021]

This joint initiative announced in the European Skills Agenda aims to support the quality, transparency and uptake of micro-credentials in the European Union. This consultation group's main objective is to explore how the EU's approach to micro-credentials could be elaborated within the higher education sector. Although micro-credentials have a clear benefit of upskilling and reskilling as well as creating personalised lifelong learning pathways, challenges remain. A need for a shared definition, collaborative uptake, validation and recognition of micro-credentials was deemed crucial. This paper's main arguments for leading a successful uptake of micro-credentials was to install a standard recognition procedure, alongside transparency and trust.

22 Ward, Rupert et al., (2021). 'Towards a 21st Century Personalised Learning Skills Taxonomy,' 2021 IEEE Global Engineering Education Conference (EDUCON), pp. 344-354, Available from: 10.1109/EDUCON46332.2021.9453883 [Accessed 19/07/2021]

This study examines previous research concerning the evolution of technology and online education. It focuses on examples relevant to the United Kingdom and the European Union, before suggesting methods for bridging the gap between the skill supply and demand by using a '21st century skills taxonomy'. This same method may support a micro-credentialing framework which would allow formal, non-formal, and informal learning to be recognised internationally. The paper explores how the 'C21 Skills taxonomy' could bridge the gap between student capability and employer recruitments as well as provide a common language for both environments. This strategy could solve present and future skill gaps, facilitate the transition to more personalised learning in higher education and involve lifelong learning within the workplace as well as education.

23 Wheelahan Leesa and Moodie Gavin (2021) 'Analysing micro-credentials in higher education: a Bernsteinian analysis', Journal of Curriculum Studies, 53:2, pp. 212-228, Available from: 10.1080/00220272.2021.1887358 [Accessed 19/07/2021]

This paper explores the emergence of micro-credentials in higher education. It argues that micro-credentials build employability skills and more modern experiences in order to develop human capital. This human capital creates an environment where higher education curriculums are more aligned with employers' expectations and the labour market requirements. This environment would increase personal development and lifelong learning skills which would allow students to anticipate labour market requirements. The higher education system must evolve and reconsider its teaching strategies in order for students to be best equipped when entering the working world, which is why micro-credentials would be a suitable addition to current teaching systems.

The literature listed above shows the study of micro-credentials and their impact on certain fields, mostly partnerships between universities and employers. However there are very few that truly explore the mutual interest and impact of micro-credentials on all four environments: academics, employers, alumni and other students of micro-credentials. This gap in the literature concerning the implementation of micro-credentials for the mutual benefit of these environments needs to be addressed for a successful micro-credential ecosystem.

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