Exploring the Potential of Micro-credentials and Digital Badging: A Landscape of Practice

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Introduction

'The acquisition of micro-credentials may become an increasingly important feature of flexible learning pathways in the future, especially in a lifelong learning context. In a world where knowledge can be acquired from many different sources, the question of the certification of learning becomes increasingly important. People can acquire knowledge and skills from many different sources and locations, work-based and online' (Brennan, 2020).

The Higher Education (HE) sector in the UK has transformed greatly over the past thirty years as a result of massification, internationalisation and the onset of new technological approaches to learning and teaching. Such changes have been exacerbated by the COVID 19 pandemic, where the sector has experienced forced change, having to adapt current HE practices to meet the needs of learners during this period. The World Economic Forum (2020) reports various forces driving change including (i) the skills agenda driven by governments both nationally and international and (ii) the technological shift – where changes in labour market have seen working patterns change (office to remote), upskilling requirements, the rise of new jobs and merging job roles due to the implementation of digital services. In the same vein, there is some debate concerning the employability gap which is defined as the variation between the knowledge gained by students during traditional degree pathways and the skills and competencies that employers require in practicality (Dewar, 2020). Such changes have led to an employer driven rise in upskilling, in competency based learning (Bennett, 2020).

Micro credentials have existed for a few years; however, the focus has mainly been on traditional style degrees across the HE sector. They are however now receiving increased interest as all in all, learner needs are changing. While organisations across various sectors have experienced transformational change, the HE sector has the opportunity to 'Build Back Better'. As such, Micro-credentials, albeit it with some contention, have gained traction during this period.

Micro-credentials and Graduate Apprenticeships

The term micro-credential is used to describe small packets of learning and skills acquisition. They include but are not exhaustive of, digital certification, open badges and industry certified certificates and are offered at under- and postgraduate level at a range of institutions (Bennett, 2020; Kato et al., 2020). In a similar vein, Graduate Apprentice schemes (GA's) offer employees the opportunity to gain a degree qualification using a combination of online learning, university-based, work visits and on the job training, depending on the institutional context. Graduate Apprenticeships offer work integrated learning for individuals who want to complete degrees whilst in employment. In the UK, GA's vary: for example, the Scotland uses a range of frameworks, whereas the English version has developed a standard approach. Assessment also varies with England offering and end point assessment and the Scottish Version offering a continually assessed approach (Gallagher and Reeve, 2019). The variances between the systems are minute, however, there is an opportunity for institutions to offer a wider, more flexible CPD offering of smaller units for people whose situation is not conducive to committing to an extended programme of study.

The increasing interest in micro-credentials by Scottish Higher Education Institution (HEIs) and their potential to recognise skills and learning in a variety of contexts is worthy of further exploration. The purpose of this scoping review is to better understand the current landscape both internationally and nationally to better understand how micro-credentials are being used

and implemented within the HE and broader sectors, particularly concerning the role they might play in the growth of Graduate Apprenticeships. This report builds the Student Transitions theme from 2017 - the cross-institutional, collaborative Open Badge project, which supported the work of the Student Transitions Theme in 2017 (Anderson, 2017). From an international perspective current practice in Europe, Australasia and Canada will be reviewed before looking specifically at Scotland.

Methodology

A scoping review, as set out by Arksey and O'Malley (2005), allows for the current landscape of a particular subject to be contextualised in the broader sense. While a systematic review is driven by a well-defined research question, scoping reviews, allow for the extent, range, and nature of a field to be explored. While a systematic review aims to synthesis and critique literature relating to a specific research question, the purpose of the scoping review is to map various areas of interest across any specific field. As such, the scoping review can then be used to address if a more in-depth systematic or literature review is required to identify gaps and emerging evidence (Arksey & O'Malley, 2005; Motheeram et al., 2018; Munn et al., 2018). Motheeram et al. (2018) note that scoping reviews are as rigorous and reliable as a systematic review, as the same approach to literature searching is applied. Arksey and O'Malley (2005) developed a five-stage framework for application: the table below maps the stages and approach taken for this review.

Table 1 Application of Arksey and O'Malley's (2005) framework

Stage	Study	Paper Section
1 – Identify the research question	• To review the current landscape both internationally and nationally • to better understand how micro credentials are being used and implemented within the HE and broader sectors	Introduction
2 - Identifying Relevant Studies	Systematic Database search: — PROQUEST — Google SCHOLAR Organisational reports — White Papers — Grey Areas	Methods
3 – Study Selection	Parameters of search set: — Timeframe — Search terms — Subject fields — Articles selected	Methods
Stage 4: Charting the Data	Data recorded: — Author — Date — Title — Abstract — Location — Sector — Position of the study	Methods
Stage 5: Collating, Summarizing and Reporting the Results	Categorisation of data By location/implementation	Findings

Study Selection

The scoping review was conducted through a search of the ProQuest research library and Google Scholar. The scope of this project was literature from the past four years given the fast-changing landscape as a result of technology and the pandemic. Geographical locations included Australia, Asia, Canada, Europe and the United Kingdom and Scotland. Keyword searches were completed in two stages:

1   Micro-credentials or open badges or digital badges and Higher Education and/or Graduate Apprenticeships

2   Higher Education, education, employment, learning skills, students, work, Graduate Apprenticeships colleges and universities, teaching, professional development and distance learning, pedagogy, college students, education policy.

It has been previously noted that there though are many thought pieces published on the internet, but a lack of quality peer-reviewed articles (Ratna Malar & Michael, 2021). Therefore, much of this scoping review will draw on policy papers, working papers and limited academic articles where available.

International Review of Practice: Framing Micro-credentials

Standardising an approach to the implementation and use of micro-credentials has raised many debates across the HE sector. There are however now, several key policy documents that attempt to do so. In education, Frameworks play an instrumental role in quality assurance (Ratna Malar & Michael, 2021). In 2008, The European Qualifications Framework (EQF) allowed for the mapping of qualification across European countries and has since been adopted by Australia, New Zealand and Hong Kong (Ward et al., 2021). In their UNESCO report 'Digital Credentialing: Implications for the recognition of learning across borders' Chakroun and Keevy (2018) make the case for a collaborative approach to develop international qualification frameworks which are 'key to expediting recognition of skills and qualifications across borders'. Some of the policy context discussed below builds on this work.

European policy context

First then is the 'European Approach to Micro-credentials' which aims to incorporate micro-credentials into the EQF (Futures et al., 2020). The European approach aims to:

- improve the quality, recognition, and take-up of micro-credentials, bringing new opportunities to a more diverse group of learners to broaden their skillsets.
- encourage people to move across the EU for education, training, or work, to achieve a European Education Area by 2025
- involve European Universities alliances and Centres of Vocational Excellence as role models.

The European Roadmap (2021) proposes that The European Approach to Micro-credentials will enhance the quality, transparency and take-up of short learning experiences leading to micro-credentials that are issued by education institutions and other training providers (e.g. private companies, chambers of commerce -Figure 1). Standardising the approach taken across Europe is seen to have benefits such as strengthening lifelong learning, attracting a more diverse student body and better assimilation with labour market needs. Furthermore, a standardised approach will ensure that HE institutions can scale up while maintaining good quality assurance standards.
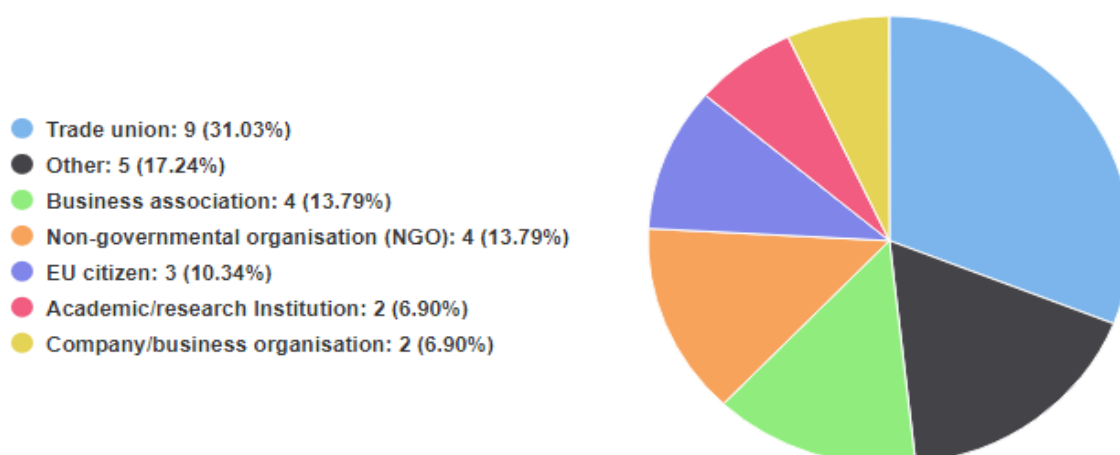
Box 3: Building blocks of a European approach to micro-credentials

> A common and transparent definition
> A defined list of critical information elements to describe micro-credentials
> Alignment to National Qualifications Frameworks (NQFs) and the European Qualifications Framework (EQF): defined levels, standards for describing learning outcomes
> Quality assurance standards
> Defined credits: European Credit Transfer and Accumulation System (ECTS), defined learning outcomes and notional workload
> Recognition: for further studies and/or employment purposes
> Portability: issuing, storage and sharing of micro-credentials
> Platform solutions for the provision and promotion of courses leading to micro-credentials
> Incentives to stimulate the uptake of micro-credentials

Positioning micro-credentials – the views of industry, employers, and education sectors

In response to the EC's roadmap for developing a 'European Approach to Micro-credentials', the European Commission consulted with a wide range of organisations including the HE sector, non-government organisations, commerce representatives, trade unions and WiSE Organisations between the period of Feb- Mar 21. Figure 2 offers a visualisation of responses by sector. These conversations were instrumental in the development of the framework so far and have provided insight into the wider discussed challenges and benefits of a micro-credentials approach towards skill development.

Figure 2 Percentage of sector-wide sources in March consultation

- Trade union: 9 (31.03%)
- Other: 5 (17.24%)
- Business association: 4 (13.79%)
- Non-governmental organisation (NGO): 4 (13.79%)
- EU citizen: 3 (10.34%)
- Academic/research Institution: 2 (6.90%)
- Company/business organisation: 2 (6.90%)

Overall, a European Framework for micro-credentials was welcomed by most organisation representatives. the general themes drawn from the first consultation feedback are noted here:

- The framework address stakeholder needs – both formal and informal training providers.
- The framework should address quality assurance, transparency, transferability, and award issues.
- Inclusivity – micro-credentials should offer opportunities to disadvantaged groups while simultaneously offering provision for professionals experiencing a skills gap.
- Flexible – designed to be credit-bearing and non-formal learning.
- Delivery mode - there was a consensus that Massive Open Online Courses (MOOCs) and digital platforms offered a flexible delivery mode.
- Providers - there was a strong consensus that non-education providers such as Non-Governmental Organisations (NGOs), adult education and volunteer providers should be part of the delivery process.
- Transferability - micro-credentials should have cross-border recognition.

While these points represent the consensus, they are not exhaustive, other points of view must also be considered. Several teaching unions including the Education Institute for Scotland (EIS) proposed alternative approaches. The EIS has positioned itself as 'safeguarding national requirements regarding qualifications to support the teaching profession, and the autonomy of educational institutions, including in regions beyond the EU and European Education Area'. When considering professional development for teachers and lecturers, micro-credentials and short courses must meet appropriate standards for quality, relevance, and be complementarity to full qualifications. A second point made by the EIS was micro-credentials should not be considered as tools of pedagogical innovation as innovation pedagogy is created through professional autonomy. Third. there is a risk that the direction of micro-credentials could accelerate the current casualisation/deskilling that is prevalent in the FE/HE sectors. Finally, the EIS highlighted the Scottish system HE/FE sectors ensure transparency, accountability, and security for learners at robust levels that cannot be replicated by the private sector. The second period of consultation is ongoing and due to end in July 2021. Finalised recommendations are expected by the end of 2021.

The Common micro-credential framework

The Common Micro credential Framework (CMF) is the European MOOC Consortium where several providers of micro-credentials[1] have worked in partnership to offer high-quality credit-bearing courses from a network of over 400 HE institutions(Future Learn, nd). The purpose of the consortium is to support learners needs around the fast-changing pace of the labour market while delivering courses online, that can be accessed from anywhere(European Commision, 2019). Future Learn states that The European Qualifications Framework (EQF) is a common European reference framework whose purpose is to make qualifications more readable and understandable across different countries and systems. The requirements are set out as follows:

- Workload: 100-150 hours, including revision for, and completion of, the summative assessment.
- Award level: Levels 6-7 (EQF) or the equivalent levels in the university's national qualification framework or be levelled at Levels 4-5 and fulfil the criteria of the European Credit Transfer and Accumulation System.
- Assessment: Summative assessment that awards academic credit, either directly following successful completion of the micro-credential or via recognition of prior learning upon enrolment as a student on a university's course of study.
- Compliance: Uses a reliable method of ID verification at the point of assessment

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[1] Parents include: FutureLearn (UK), FUN (France), MiríadaX (Spain and IberoAmerica), EduOpen (Italy), and OpenupEd/ the European Association of Distance Teaching Universities (EADTU)

that complies with the recognised university's policies and/or is widely adopted across the platforms authorised to use the CMF.

- Credit Transfer/award: Provides a transcript that sets out the learning outcomes for a micro-credential, total study hours required, EQF level, and the number of credit points earned.

Australasian policy context

In response to the COVID-19 pandemic, the Australian government introduced, new short courses in HE to address the skills gap across priority areas including teaching, health, science, information technology and agriculture. The 'Higher Education' certificate has a duration of 6 months and can be formalised under the Australian Qualifications Framework (AQF) until the end of 2021 (Wheelahan & Moodie, 2021). The requirement criteria are as follows:

- have foundational knowledge sufficient to undertake qualifications at the 5, 6 or 7 AQF level.
- have foundational skills sufficient to undertake qualifications at the 5, 6 or 7 AQF level.
- demonstrate a foundation of application of knowledge and skills sufficient to undertake qualifications at the 5, 6 or 7 AQF level.

That aside, the Australian government have only recently reviewed the nature of micro-credentials announcing in June 2020 a funding stream of $4.3 million to support the development and operation of a one-stop shop for micro-credentials (Department for Education Skills and Employment, 2020). The source is expected to offer students standalone qualification or modules that will complement other HE courses. At this point time, a framework for implementation is not clear. The Government will review the Undergraduate Certificate before the end of 2021 to determine its suitability to become a permanent part of the AQF Independently. Beverley Oliver (2019) is seen to be at the forefront of educational change in Australia and puts forth that there is a need for more granular certified learning to deal with the ever-increasing changes to the labour market, For Oliver (2019), certified micro credentials in both formal and non-formal can support the development of skills and capabilities and skills matching in the labour market. For Oliver, a certified granular approach to learning will support the development of competencies and lead to better skills matching for employers. As part of the AQF review, it was recommended that HEIs should establish policies/taxonomies to frame micro-credentials. However, some universities have developed micro-credentials that focus on core employability/capability skills which were aligned to the AQF and industry needs (Bowles et al., 2019).

For example, Deakin University has developed a series of Professional Practice Credentials which support the development of soft skills. Ratna Malar and Michael (2021) from Deakins University puts for that there are four models of micro-credentials operating in Australia:

1   Postgraduate short courses and programs based on credentialing demonstrated outcomes, or selling recognition of prior learning (RPL)

2   Postgraduate courses built up by undertaking several shorter courses for academic credit and stacking those credits to attain a recognised award (usually a Graduate Certificate)

3   Undergraduate: where series of short, accredited courses may be used to augment a fuller program (typically x4 = 1), that may replace one or two courses (units) in a 24 course (unit) program. These are typically skill-based.

4   Undergraduate: non-accredited, or co-curricular courses to demonstrate experience and enhance a student's portfolio with the view to enhancing employability prospects. (Sankey, 2019)

5   In 2018, the New Zealand Qualifications Authority (NQZA) launched a standalone micro-credentialed education system. The NQZA quality assures micro-credentials within its framework. However, it is too early to explore the impact due to a lack of empirical research.
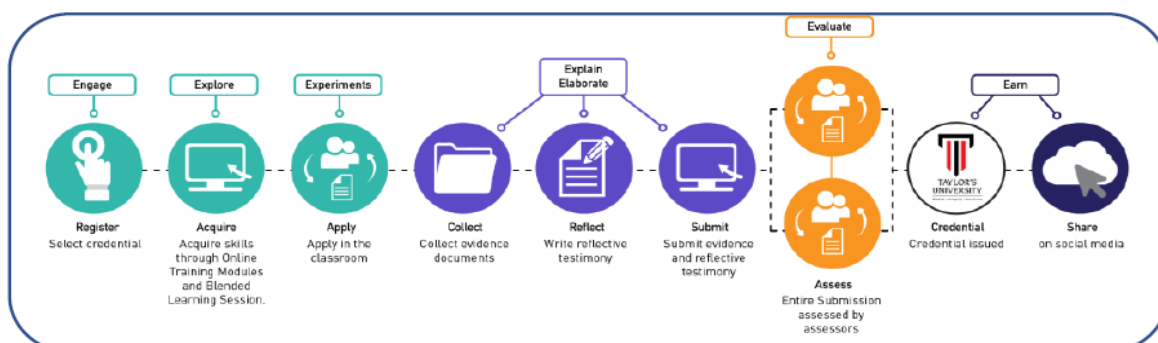
Malaysian Policy context

Around the same time as the Australian Qualification Review, The Malaysian Qualification Agency produced detailed guidance for the implementation and execution of micro-credentials (Figure 3). Central to this guidance was the importance of using the guidelines in alignment with other key policies such as Policies on the offering of short courses, Credit Transfer; Accreditation of Prior Experiential Learning; Credit Transfer for Massive Open Online Courses and other quality assurance documents (Malaysian Qualification Authority, 2018). The guidelines were developed based on the wider work of UNESCO:

- Lifelong Learning – reskilling/upskilling
- Alternative – flexible pathways
- Access – Online delivery means awards are more accessible for all.
- Stickability - credit-bearing and credit transfer based that can be used towards a wider degree style qualification.
- Recognition of Non-Formal Learning – Allowing for previous learning to be considered for credit.

In addition to this, MQF states that micro-credentials should be outcome-based, context dependents, industry-driven, secure, and sharable. Most importantly, the guidance highlights the need for a robust quality management system from development through to design, delivery and review. It is also recommended that providers of micro-credentials seek external quality assurance for accountability. Taylors University is a private Malaysian university that implemented this model, to provide a digital badge for professional development programmes for academics. The purpose was to provide recognition for the acquirement of new skills, knowledge, and learning.

Figure 3 MQF micro-credential ecosystem

Canadian Policy Context

In Canada, the Ontario Student Assistance Program accepts applications where postsecondary institutions must partner with employers, industry or sector representatives and demonstrate how the proposed micro-credential will add value to the current employment landscape in terms of upskilling or talent growth. Micro-credentials are geared towards specific fields such as health care, technology, business. Jean Louise (2021) notes that while micro-credentials are open to anyone, a target-specific criterion drives them forward in Ontario in a bid to meet the skills agenda:

- Unemployed or laid-off workers who need to reskill to get back to work with skills that are in demand.
- People who have a job but need to upskill to help improve productivity and performance.
- Gig workers such as independent contractors, online platform workers, contract firm workers, on-call workers and temporary workers are part of a fast-growing labour market characterized by short-term contracts or freelance work rather than permanent jobs.

The framework includes formative assessment to demonstrate learner competence and awards range from informal to formal including badges, certificates, nanodegrees, professional certificates, and Micro Masters recorded in a digital wallet or e-portfolio. The issue of transferability is also addressed as such qualifications provided by a university or college is included on a learner's transcript.

MOOCs

in terms of delivery, the majority are delivered online – although blended models have not been rules in the future. This mode of delivery allows for learner mobility, allowing learners to move to meet career objectives. MOOCs have been and remain the key mode of delivery for micro-credentials. This has been accelerated by the COVID 19 pandemic which has driven systems change whereby all teaching shifted to online learning supporting flexibility in how and when courses are delivered. Many universities deliver online courses in partnership with platform providers although some use their own virtual learning environments such as Blackboard and Moodle (Morris et al., 2020).

Class central is a course directory which provides access to over 40,000 MOOC courses. There are according to class central, five main providers who collaborate with HEIs to deliver micro-credentials. In 2018, more than 100 million people accessed courses through MOOCs with around 900 universities offering around 11,400, offering a stark reality of the scale of provision (Resei et al., 2019). Study timeframes range from 1-15 months with fees depending on the level of qualification – free to postgraduate (Resei et al., 2019). Table 2 lists the main platforms and range of micro-credentials that are currently offered as compiled by Shah (2020).

Table 2 Micro-credential providers and accreditation award

Platform	Micro-credentials
Coursera	Specialisation, MasterTrack Certificate, Professional Certificate
edX	XSeries, MicroMasters, Professional Certificate, Professional Education
Udacity	Nanodegree
FutureLearn	Programme, Graduate Certificate, Graduate Diploma
Kadenze	Programme

MOOCs are seen to be attractive for several reasons. As well as flexibility, reach and variation, however, some research indicates that they have negative effects on universities. For example, Class central reaches far and wide. The existence of such a resource that highlights the corporate relationship between universities and private providers. Morris et al. (2020: 2) also raise this point in their discussion of unbundling, which is defined as 'organisational changes in software and law'. The provision of MOOCs is argued to harm the structure of the traditional university. For example, quality assurance – whereby universities have strict guidelines and infrastructure – where there is a physical requirement to attend university. The impact on learners is not fully yet known. Both these points highlight the need for a standardised framework that supports quality assurance for all learners.

Quality Assurance

Government response with regards to regulation and quality assurance is inconsistent across the globe as demonstrated, frameworks are mainly still in the early stages. However, the frameworks discussed so far all highlight the need for robust quality assurance. Although research in this field is limited, there are some examples of good practice can be drawn from New Zealand, wherein 2018 the Zealand Qualifications Authority established a framework for regulating micro-credentials where they must meet the same guidelines relating to training schemes and assessment standards which are continuously reviewed (Futures et al., 2020). Quality assurance is also instrumental to the Malaysian Qualifications Framework which sets out the following to ensure rigorous standards for all stakeholders involved in the process:

- courses or modules in the MC adhere to the good principles in the development, design, delivery, assessment, overall management and enhancement of the courses or modules.
- Providers of the MCs can voluntarily seek external quality assurance of the quality management system (QMS) i.e., systems used in the development, design, delivery, review, and enhancement of MCs from Malaysian Qualifications Authority (MQA).
- MQA will carry out a quality audit exercise based on this guideline and the Higher Education Providers (HEP's) QMS to provide a report on the HEP's effectiveness in the design and delivery of the MCs. The quality audit by MQA will provide confidence to stakeholders that all internal and external requirements relating to the MCs are met by the HEP.

Recognition and Award

The two main forms of recognition that micro-credentials offer are (i) credit-bearing or (ii) digital/open badges. Credit-bearing micro-credentials are more often linked to formal education institutional whereas the scope for open badges is much wider. Chakroun and Keevy (2018) note that badges, for example, can be collected through open learning social media sites such as LinkedIn, Jive, Fidelis, Credly and Mozilla however, badges can also be linked to more formal educations through platforms such as those illustrated in Table 2. Furthermore, organisations from industry are also increasingly gaining recognition for developing their own badges, such as IBM and Google. Badges are effectively seen as recognition of prior learning whereas micro-credentials are mainly seen to be accreditation of prior learning(Kato et al., 2020). Some research advocates for badges as they shift measurement from measuring through 'achievement towards capturing, validating and recognising learning' (Hickey et al., 2020: 943). Others have found that badges play a positive role in increasing student engagement (Roy & Clark, 2019) and that they can be beneficial for learning in developing personal identities within professional communities (Risquez et al., 2020).

A recent study by Donnelly and Maguire (2020) in Ireland explored the impact of digital badges through the design and development of a suite of open-access professional development (PD) courses in teaching and learning. The researchers were also interested in the scalability of the courses. Courses were mapped to Irelands Professional Development Framework. Key findings indicate that badges were perceived positively by students and staff as recognition of achievement. Furthermore, the course was scalable. That aside the researchers were aware that quality assurance remains an issue and recommended that if there was demand, HEIs should integrate digital badges in current programs which will ensure QA guidelines are adhered to.

The frameworks under development attempt to address some of the larger debates around the potential of micro-credentials around accreditation, recognition, and quality assurance. Furthermore, a European funded report written by Resei et al. (2019) puts forth that research around the implementation and impact of micro-credentials is limited and lacks empirical evidence. Having explored the wider international context of micro-credentials, the focus now draws specifically to the Scottish landscape.

Scottish Landscape

The purpose of this section is to develop a greater knowledge of the current context of micro-credentials in Scotland. Specifically, the policy context, implementation and delivery, target audience and quality assurance.

Scottish policy context

The rise of micro-credentials in the Scottish context is driven predominantly by the transformative change that has occurred as a result of the ongoing COVID -19 Pandemic. The shift towards a digital society has been transformative as all sectors have adapted towards delivering services remotely. In March 2021, The Scottish Government relaunched their digital strategy 'A Changing Nation: How Scotland Will Thrive in A Digital World'. The strategy sets outs how the shift towards a digital economy goes beyond digital thinking and requires a transformative approach to the ways we think digitally (Scottish Government, 2021). The policy documents note that there are three key opportunities for Scotland to move forward in the digital age:

- designing and implementing technology in a secure, efficient, and user-centred way
- realising the potential of data to improve services, increase efficiency and deliver better outcomes.
- transforming our culture and the way we work through digital thinking, with its emphasis on openness, networking, and agility.

Specific to education, the digital strategy sets out how the actions fit with the National Improvement Framework (see Figure 4.)

Figure 4 National Improvement Framework - strategic fit

As with other HE sectors across the globe, micro-credentials have begun to gain traction in the Scottish Sector. All three qualifications frameworks in Scotland are able to support micro-credentials (Quality Compass, 2021) the Scottish Funding Council announced additional university upskilling funding for micro-credentials in the 2020-21 academic year through the National Transition Training fund. This is significant for the HE sector, where there has been an ongoing debate around how lifelong learning has signified a need to 'reimagine the university' (Dewar, 2020) to ensure that today's learners are prepared for the current labour landscape.

As with other countries, the potential for micro-credentials/digital credentialing has been brought into recent focus, via the current pandemic, where there is the likelihood of an increasing number of people looking into opportunities for upskilling and career change using an online platform given the need to work remotely. Micro-credentials have the potential to (a) recognise skills via an accredited course and (b) apply those skills, which have been gained in one area to another, making them an ideal way for job applicants to demonstrate their knowledge and skills. Offering micro-credentials online also offers participants support from tutors and fellow students, fostering a sense of community. It is, therefore, timely to further investigate micro-credentials and their potential recognition by digital credentialing. However, to date, there is little evidence documenting the impact of micro-credentials and government responses are not clear (Kato et al., 2020). To this point, micro-credentials have been contested within the Scottish Sector. While the benefits have been noted in terms of the flexibility micro-credential can bring, there are still concerns around the credibility, quality assurance and management of micro-credentials within the sector (Anderson, 2017) correct reference.

Micro-credentials in the Scottish HE Sector

Target audience

Like the international context, course provision throughout the HE sector is targeted towards those negatively impacted by the COVID-19 pandemic i.e., those facing redundancy, or those required to upskill, however many also offer Continuous Professional Development opportunities. Universities Scotland notes that demand for such courses during the pandemic was high, (i) due to the number of individuals who were furloughed and (ii) due to travel constriction which offered individuals the opportunities to partake in digital courses. The Open University(nd) offers an example of good practice with its programme '*Partnership Action for Continuing Employment and The Open University*' which provides accessible upskilling opportunities for individuals and businesses across the length and breadth of Scotland. Increased skills, employability, and productivity are vital to helping the economy.

Also responding to the current wider landscaper, the University of Glasgow offers upskilling, five health care related courses and two business management, all fully funded by the SFC(Scottish Funding Council, 2020). These courses are specifically designed These micro-credentials are accredited online courses designed to help learners build specialised skills relevant to their career. Applications indicated a high demand for such courses and early insight data signifies that:

- 235 companies were represented.
- 12.7% of applicants were unemployed.
- Geographically wide scope – applicants from all 16 postcode areas in Scotland

Implementation

In addition to the development of GA'S, the HE sector has become responsive to the fast-moving labour market changes brought on by the pandemic where the shift to remote working has required upskilling across the labour market fields such as industry, the public sector, and small and medium-sized enterprises (SME's). Universities Scotland notes that short courses available include:

- digital skills
- upskilling for healthcare staff
- digital business and transformational change
- business management
- entrepreneurial skills

At the time of writing, the Scottish Content remains dominated by Massive Open Online Courses (MOOCs) as a mode of delivery with the Open Universities 'open learn' offering a range of bite-size courses being offered to learners as tasters' session of the more developed, credit-bearing but fee-paying courses offered by the Open University (OU's) sister site, Future Learn. Many of the courses are available on Class Central as discussed in the previous section on MOOCs. Class Central lists the following courses as micro-credentials affiliated with Scottish Universities (Figure 5).

Figure 5 Micro-credentials listed on class central by Scottish Universities.
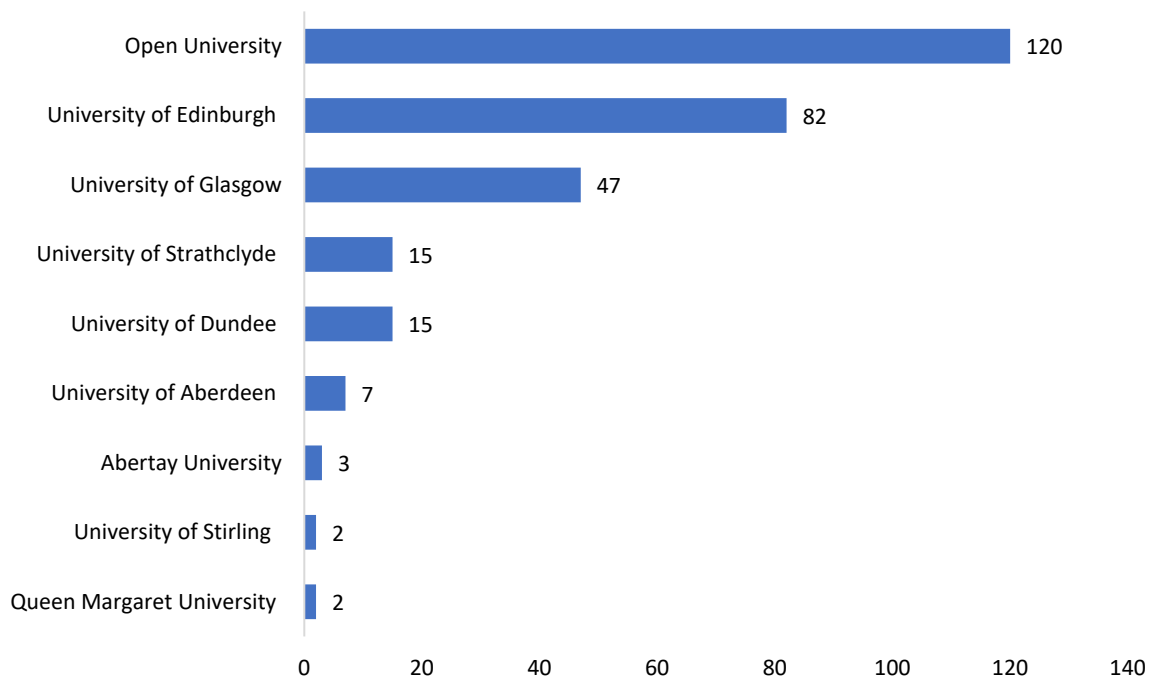
Source: Authors own compilation from Class Central (2021)

Figure 6 illustrates the range of micro-credentials being offered on class central although it must be noted that this list is not exhaustive and continues to expand.

Figure 6 Number of subjects offered across Scottish Universities.
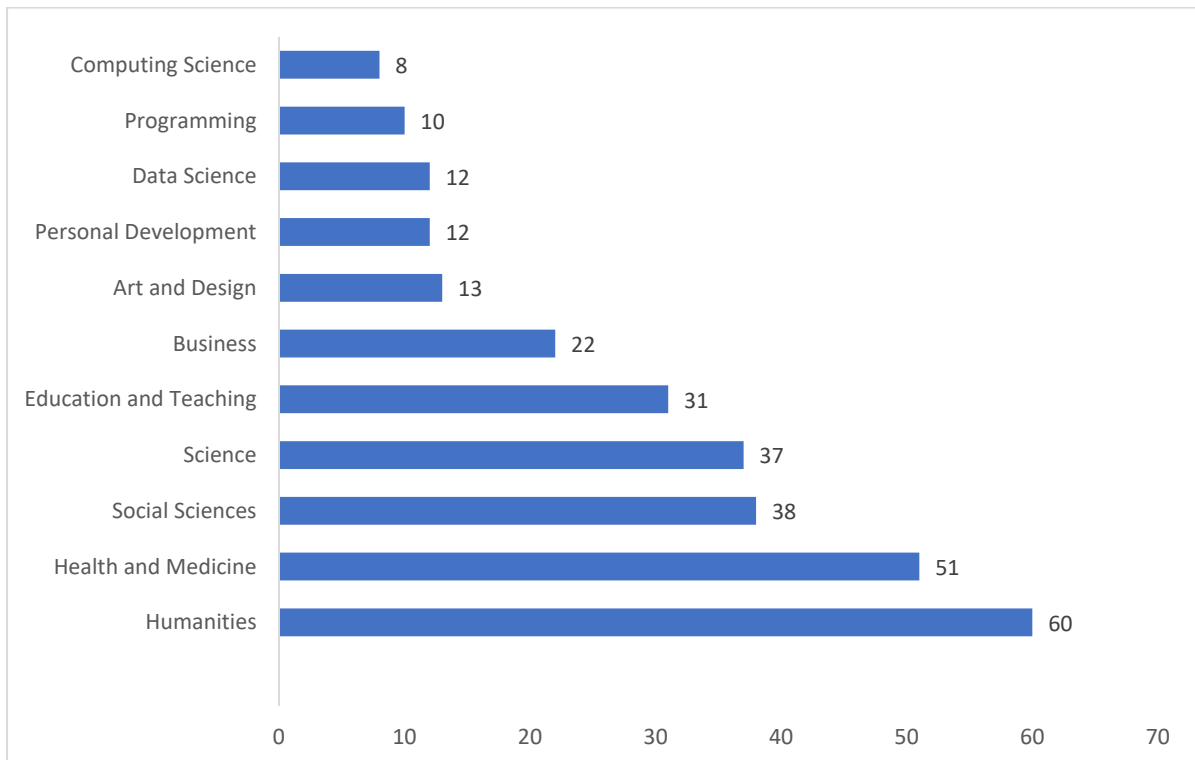
Source: Authors own compilation from Class Central (2021)

The data illustrated provides insight into the extent to which micro credentials within the Scottish Sector are becoming embedded in the global market, through using class central as a repository for MOOCs. While this, list is not exhaustive it again highlights the point that there is a need for a framework to ensure quality assurance.

In their response to the Scottish Funding Council (SFC'S) '*review of coherent provision and sustainability',* Universities Scotland (2020) note that potential models for future delivery of micro-credentials include the modularising of PGT programmes, specific to key areas where upskilling is required to meet labour market needs. This can be demonstrated for example by the University of Stirling's PGT fully funded modules in Project Management, Data Analytics and Work and Leadership in the Age of AI released last month which all currently have waiting lists(University of Stirling, 2021). In alignment with the international landscape, a working group has been established to ensure modules are stackable and portable allowing students to work towards a degree. Other examples of implementation are highlighted by Universities Scotland (2020) are noted below:

- **Robert Gordon University**: offers SFC fully funded upskilling modules ranging from 15 credit modules to non-accredited. Demand was high with an estimated 400 applications for 100 places. Interest was noted to be higher for the non-accredited modules. The courses were positively received and almost all went through to completion.
- **Edinburgh Napier University**: development of micro-credentials aimed at upskilling, Continuous Professional Development and expansion of their Global online programme which currently supports over 1200 students(Edinburgh Napier University, 2020). Completion of the micro-credential will result in an award at Scottish Credit and Qualifications Framework (SCQF) level 11 which will offer a stackable pathway or access to a full Masters (MSC). Examples include the development of three standalone modules worth 20 credits each, combined they form a Post Graduate certificate.
- **University of St Andrews**: The focus is again on upskilling, in particular, the digital strategy coupled with a distant learning programme as well as transition support for those re-entering, HE. Modules can be stand-alone or combined into Postgraduate Certificate in Data Science and a Postgraduate Certificate in Criminal Risk to the Digital Economy or a Postgraduate Diploma which combines the two topics.

The University of Aberdeen also offers over 111 on-demand learning provision (micro-credentials) in collaboration with Future learn, of which 97 are a postgraduate/undergraduate level and cover a wide range of industry 4.0 skills and competencies (University of Aberdeen, n.d.)

While the examples demonstrate how universities are adapting to fit labour market needs, they also highlight the lack of standardisation in the Scottish sector with regards to variation in the number of credits allocated to modules at different institutions.

Graduate Apprenticeships

Apprenticeships at university level are a UK-wide initiative. The Sottish model of Graduate Apprenticeships (GA) sits within the remit of Skills Development Scotland (SDS) and is distinctly different from Degree Apprenticeships in other parts of the UK. The GA model offers students work-based learning opportunities up to master's degree level (Skills Development Scotland, 2019). GA's are created in partnership with industry and the FE/HE education sector. The purpose of GA's is to address the skills/competencies gap that industry sees in students who make the transition from traditional degree to the workplace (Smith et al., 2020; Taylor-Smith et al., 2019). Furthermore, GA's are accessible

to employees already in the workplace who may wish to obtain a degree. The benefits of GA'S focus around learning in the workplace, leading to the realisation that learning happens everywhere - not just at an academic institution, for the student and workforce development for employers. This ensures that business needs are met. GAs were originally fully funded through SDS and the European Social Fund, however, the Scottish Funding Council has committed to embedding GAs as core funding with £16.2 million allocated to work-based apprenticeships of which 1370 GA's will be funded (Scottish Funding Council, 2020).

In the four-year period since the inception of GA's, SDS (2021) have reported that 3500 have accessed this model of learning. The number HE'S in Scotland currently offering GA's has increased from nine to thirteen with the number of employers increasing from 140 in 17/18 to 500 in 20/21 (SDS,2021). In terms of uptake, business management and engineering have higher rates than others. Demographics indicate that the age group 25-34 continues to increase from 226 in 18/19 to 403 in 2021 suggesting that those applying are not in their first jobs and are interested in upskilling. The number of early leavers is slowly decreasing from 28.9% in 17/18 to 15.9% in 19/20. However, those who leave still received recognised component of their degrees. As Figure 7 shows, it is still too early to make assumptions about the true impact of GA's.

Figure 7 SDS Summary of all GAs to date

	2017-18		2018-19		2019-20		2020-21	
	No.	% of all GAs	No.	% of all GAs	No.	% of all GAs	No.	% of all GAs
Achievers	55	19.9%	47	5.1%	*	*	-	-
Partial Achievers	53	19.1%	98	10.7%	18	1.6%	-	-
Early Leavers	27	9.7%	130	14.1%	166	14.3%	44	3.8%
Still in Training	142	51.3%	644	70.0%	969	83.8%	1,113	96.1%
Made Redundant	-	-	1	0.1%	*	*	1	0.1%
Total GAs	**277**	**100.0%**	**920**	**100.0%**	**1,157**	**100.0%**	**1,158**	**100.0%**

Universities Scotland (2020) has noted interest in progressing discussion with SDS to further develop the GA model and to expand the range of disciplines currently offered, while ensuring labour market needs are met. As noted in Universities Scotland's response to the SFC, ways to develop the GA model were as follows:

- Adapting the funding model to allow for long-term planning and development, including building relationships with employers.
- Expanding the range of courses offered and size of cohorts, in Social Work or other science, technology, engineering and mathematics (STEM) areas.
- Allowing greater flexibility, including part-time offering which may be crucial for certain demographics, more exit points, and the ability to pause study.
- A framework that supports and prepares Modern Apprentices to progress to GAs.
- Facilitating transition between GA and traditional modes of study where this is to the benefit of the learner.
- Expanding into SCQF Level 11, for Engineering programmes.
- Continuous collaboration with SDS and industry to meet labour market needs.

Smith et al. (2020) note that while GA'S seem like a 'win-win' situation, implementation of Graduate Apprenticeships is seen to be primarily useful for students in the workplace who can committee to full length courses. The research conducted by Smith et al revealed that student apprenticeships found work-based learning challenging as the skill/knowledge levels progressed. Other research as discussed by Smith et al, suggests that the commitment to GAs may be more suited to individuals who have developed their careers as opposed to school leavers. This aligns with the point made by Kay et al., (2021:501) who re-iterate,

'Work Integrated Learning is about more than a job, placement, or project. Work Integrated Learning experiences, and reflection upon those experiences, result in a range of important long-term outcomes such as career clarity, vocational self-concept, meaning, and purpose'. The changing pace of the labour market indicates that micro credentials could offer more flexibility through modular blocks while still building towards a full degree. Furthermore, integrating micro-credentials with graduate apprenticeships with would ensure quality assured delivery.

Summary

It is evident, the micro credentials are becoming embedded in HE sectors both nationally and internationally with the development of frameworks well under way. The following can be surmised from all frameworks:

- the main purpose of developing micro-credentials is for upskilling.
- there is debate around whether these should be delivered by HE institutions or the wide private and third sectors.
- there are inconsistencies across
- Traditional degree approaches are not always the approach for adult learners who are up/reskilling.
- Collaboration is highlighted key.
- Credit transfer
- Quality assurance
- Link micro-credentials to the in-demand (or soon to be in demand) skills and competencies employers are seeking.

Around the world, micro-credentials are gaining recognition as an alternative tool for learning that offers flexibility to learners in an ever-changing landscape.

Recommendations

While it is evident that micro-credentials are gaining traction in the Scottish Sector today. We must develop a framework based on the good practice reviewed in this paper. Some recommendations for HEI's are as follows:

- Explore the current trends internationally to develop a standardised framework in terms of terms of modularity, stackability and variation of level.
- Address the knowledge gap around micro credentials framework– explorative research is required to better understand the issues being faced around quality assurance, standardisation and measure impact.
- Explore the possibility of creating an integrated framework between micro-credentials and graduate apprenticeships ensuring the robust and transparent quality assurance measures are embedded to ensure HEI's in Scotland continue to deliver a high standard of teaching and learning.

References

Anderson, L., Shennan, K., Blackwell-Young, J., Greenhill, A-M., Perkins, J., Pryor, M., Maxwell, C. (2017). *Open badges in the Scottish HE sector: The use of technology and online resources to support student transitions.*: Universities of Dundee, Aberdeen And Abertay.

Arksey, H., & O'Malley, L. (2005). Scoping studies: towards a methodological framework. *International Journal of Social Research Methodology, 8*(1), 19-32.

Bennett, L. (2020). Micro-credentials–implications for the future of university qualifications. *Editors: Dr UG Singh (University of KwaZulu-Natal, South Africa) Prof CS Nair (Victorian Institute of Technology, Australia) e-ISBN: 978-1-990901-49-2*, 114.

Bowles, M., Bowes, N., & Wilson, P. (2019). Future-proof human capabilities: Raising the future employability of graduates. *International Journal of Business and Social Science, 10*(11), 18-29.

Brennan, J. (2020). Flexible learning pathways in british higher education: a decentralized and market-based system.

Chakroun, B., & Keevy, J. (2018). Digital credentialing: Implications for the recognition of learning across borders.

Department for Education Skills and Employment. (2020). Marketplace for online microcredentials.   Retrieved 2nd June, 2021, from https://ministers.dese.gov.au/tehan/marketplace-online-microcredentials

Dewar, J. (2020). The role of universities in times of crisis: a vice-chancellor's perspective. *Qualitative Research Journal, 20*(4), 405-410.

Donnelly, R., & Maguire, T. (2020). Establishing and Sustaining National Partnerships in Professional Development and the Recognition of Open Courses in Teaching and Learning through Digital Badges. *Australasian Journal of Educational Technology, 36*(5), 1-17.

Edinburgh Napier University. (2020). Global Online.   Retrieved 10th June, 2020, from https://staff.napier.ac.uk/services/international/Pages/Global-Online.aspx

European Commision. (2019). EMC launches Common Microcredential Framework. Retrieved 22nd May, 2021, from https://epale.ec.europa.eu/en/content/emc-launches-common-microcredential-framework

European Commision. (2021). Micro-credentials – broadening learning opportunities for lifelong learning and employability.   Retrieved 2nd June, 2021, from https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12858-Micro-credentials-broadening-learning-opportunities-for-lifelong-learning-and-employability_en

Future Learn. (nd). The Common Microcredential Framework.   Retrieved 11th June, 2021, from https://www.futurelearn.com/info/the-common-microcredential-framework

Futures, H. S., Andersen, T., & Larsen, K. N. (2020). *A EUROPEAN APPROACH TO MICRO-CREDENTIALS*. Luxemburg.

Gallacher, J. and Reeve, F., (2019). FE and skills in Scotland: the implications of a policy led and 'managed'approach?. *Journal of Education and Work*, *32*(3), 238-250.

Hickey, D. T., Uttamchandani, S. L., & Chartrand, G. T. (2020). Competencies in Context: New Approaches to Capturing, Recognizing, and Endorsing Learning. In M. J. Bishop, E. Boling, J. Elen & V. Svihla (Eds.), *Handbook of Research in Educational Communications and Technology: Learning Design* (pp. 547-592). Cham: Springer International Publishing.

Kato, S., Galán-Muros, V., & Weko, T. (2020). The emergence of alternative credentials.

Kay, J., McRae, N., & Leoni, R. (2020). Two institutional responses to work-integrated learning in a time of COVID-19: Canada and Australia. *International Journal of Work - Integrated Learning, 21*(5), 491-503.

Malaysian Qualification Authority. (2018). Guideline on Micro-Credential. Selangor.

Morris, N. P., Ivancheva, M., Coop, T., Rada, M., & Swinnerton, B. (2020). Negotiating growth of online education in higher education: Revista de Universidad y Sociedad del Conocimiento. *International Journal of Educational Technology in Higher Education, 17*(1).

Motheeram, P., Botha, A., & Herselman, M. (2018). A scoping review of digital open badge

ecosystems in relation to resource-constrained environments. *TD: The Journal for Transdisciplinary Research in Southern Africa, 14*(1), 1-10.

Munn, Z., Peters, M. D. J., Stern, C., Tufanaru, C., McArthur, A., & Aromataris, E. (2018). Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Medical Research Methodology, 18*(1), 143.

Murray, G. (2021). United Kingdom : Building Better Futures with Graduate Apprenticeships. *MENA Report*.

Oliver, B. (2019). Making micro-credentials work for learners, employers and providers. Melbourne: Deakin University. Retrieved 5th July 2021 from: https://dteach.deakin.edu.au/wp-content/uploads/sites/103/2019/08/Making-micro-credentials-work-Oliver-Deakin-2019-full-report.pdf

Open University. (nd). Upskilling Scotland.   Retrieved 1st June, 2021, from https://www.open.ac.uk/scotland/our-work/upskilling-scotland

Quality Compass. (2021). Which Way for Micro-Credentials.   Retrieved 20th May, 2021, from https://www.qaa.ac.uk/docs/qaa/news/quality-compass-which-way-for-micro-credentials.pdf?sfvrsn=25c6d481_8

Ratna Malar, S., & Michael, S. (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, 12*(1).

Resei, C., Friedl, C., Staubitz, T., & Rohloff, T. (2019). *Micro-credentials in EU and global*: Hasso Plattner Institute.

Risquez, A., Cassidy, D., & O'Suilleabhain, G. (2020). Badge of honour? An exploration of the use of digital badges to support a partnership approach to faculty development. *Australasian Journal of Educational Technology, 36*(5), 18-29.

Roy, S., & Clark, D. (2019). Digital badges, do they live up to the hype? *British Journal of Educational Technology, 50*(5), 2619-2636.

Scottish Funding Council. (2020). £1.9b announced for 2021-22.   Retrieved 10th June, 2021, from http://www.sfc.ac.uk/news/2021/news-84544.aspx

Shah, D. (2020). Massive List of MOOC-based Micro credentials. *The Report by class central*   Retrieved 22nd May, 2021, from https://www.classcentral.com/report/list-of-mooc-based-microcredentials/

Skills Development Scotland. (2019). Graduate Apprenticeships.   Retrieved 2nd June, 2021, from https://www.skillsdevelopmentscotland.co.uk/what-we-do/apprenticeships/graduate-apprenticeships/

Skills Development Scotland. (2019). At SCQF Levels 8-11 Progress report June 2021 Incorporating programme activity from 2017 to 2020   Retrieved 2nd July, 2021, from https://www.skillsdevelopmentscotland.co.uk/media/47944/ga-report-2021_30-june.pdf

Smith, S. (2019). Associate feature: Graduate Apprenticeships are a perfect fit for Scotland's STEM sector. *Holyrood*.

Smith, S., Caddell, M., Taylor-Smith, E., Smith, C., & Varey, A. (2020). Degree apprenticeships - a win-win model? A comparison of policy aims with the expectations and experiences of apprentices. *Journal of Vocational Education & Training*, 1-21.

Taylor-Smith, E., Smith, S., Fabian, K., Berg, T., Meharg, D., & Varey, A. (2019). Bridging the Digital Skills Gap: Are computing degree apprenticeships the answer?, *Proceedings of the 2019 ACM Conference on Innovation and Technology in Computer Science Education* (pp. 126–132). Aberdeen, Scotland Uk: Association for Computing Machinery.

Universities Scotland. (2020). Universities Scotland response to Scottish Funding Council's Review of Coherent Provision and Sustainability.   Retrieved 2nd June, 2021, from https://www.universities-scotland.ac.uk/briefing-evidence/universities-scotland-response-to-scottish-funding-councils-review-of-coherent-provision-and-sustainability/

University of Stirling. (2021). Upskill with a free short course.   Retrieved 31st May, 2021, from https://www.stir.ac.uk/study/professional-development/upskill-with-a-free-short-course/

University of Aberdeen. (n.d.) Short Courses. Retrieved 7th July 2021, from: https://on.abdn.ac.uk/courses/#all-courses

Ward, R., Philips, O., Bowers, D., Crick, T., Davenport, J., Hanna, P., et al. (2021). *Towards*

a 21st century personalised learning skills taxonomy. Paper presented at the IEEE Global Engineering Education Conference, Austria (Virtual).

Wheelahan, L., & Moodie, G. (2021). Analysing micro-credentials in higher education: a Bernsteinian analysis. *Journal of Curriculum Studies, 53*(2), 212-228.

World Economic Forum. (2020). The Future of Jobs Report 2020. Retrieved 6th July 2021 from http://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf