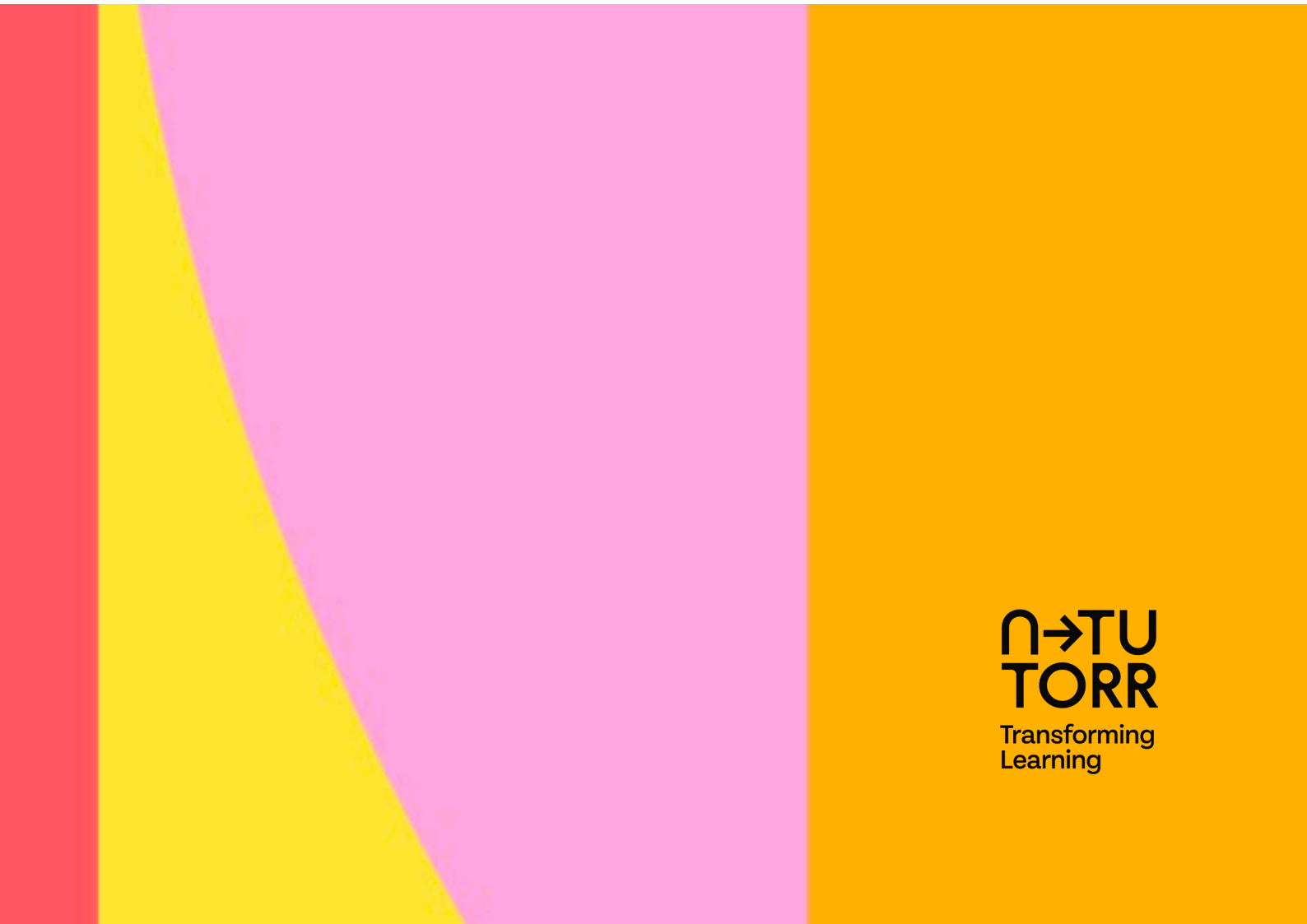
N-TUTORR micro-credentials needs analysis **report**

Unlocking pathways:
a needs analysis of micro-credentials offered by the TU sector to address industry skill needs in Ireland

N-TUTORR Stream 1, 2023
Dr Sarah Carroll, with Dr Carina Ginty and Dr Moira Maguire
Green Paper



Contents

Contents (continued)

LIST OF FIGURES

LIST OF TABLES

List of abbreviations

ATU	Atlantic Technological University
BTEI	Back To Education Initiative
CPD	Continuous Professional Development
DkIT	Dundalk Institute of Technology
ECTS	European Credit Transfer System
ECIU	European Consortium of Innovative Universities
ESRI	Economic and Social Research Institute
ETB	Education Training Board
FET	Further Education and Training
HE	Higher Education
IADT	Institute of Art, Design and Technology
ICT	Information, Communications and Technology
ILO	International Labour Organisation
IoT	Institute of Technology
IRQ	Irish Registry of Qualifications
ISCO	International Standard Classification of Occupations
IT	Information Technology
IUA	Irish Universities Association
IVET	Initial Vocational Education and Training
MOOC	Massive Open Online Courses
MTU	Munster Technological University
NFQ	National Framework of Qualifications
N-TUTORR	National Technological University Transformation for Recovery and Resilience
NUTS	Nomenclature of Territorial Units for Statistics
OECD	Organisation for Economic Co-operation and Development
OJA	Online Job Advertisement
PAEC	Programmes and Awards Executive Committee
QQI	Quality and Qualifications Ireland
SETU	South East Technological University
SLMRU	Skills and Labour Market Research Unit
SOLAS	An tSeirbhís Oideachais Leanúnaigh agus Scileanna
SPA	Special Purpose Award
TU	Technological University
TU Dublin	Technological University Dublin
TUS	Technological University of the Shannon
VET	Vocational Education and Training

Executive Summary

1

1 Executive Summary

Micro-credentials are certificates that are awarded to learners upon successful completion of a short learning experience, that act as a record of attainment of a specific set of skills or knowledge. With the rapid pace of technological and social change, many employers are seeking more agile and targeted forms of education and training to meet their evolving needs. Micro-credentials are increasingly seen as a potential solution to this challenge, and bridge the gap between traditional qualifications and the demands of industry. In the Irish higher education sector, there is a long-established tradition of recognising shorter learning experiences, particularly in the Technological University sector, with the award of non-major awards such as Special Purpose Awards. However, there is currently limited coordination or standardization across the higher education and further education and training sectors in terms of how micro-credentials are defined, developed, and delivered.

This report presents a needs analysis that was conducted as part of Stream 1 of the National Technological University Transformation for Recovery and Resilience (N-TUTORR) programme. The overarching aim of the N-TUTORR programme is to transform learning, teaching, and assessment by focussing on transforming the student experience and developing the capabilities of all staff to address a sustainable pedagogical and learning environment. The N-TUTORR programme is funded under the National Recovery and Resilience Plan (NRRP), supported by the EU Next Generation Fund. The programme is a partnership between the five technological universities (Atlantic Technological University, Munster Technological University, South East Technological University, Technological University Dublin, and Technological University of the Shannon), two Institutes of Technology (Dundalk Institute of Technology and the Institute of Art, Design and Technology), supported by the Technological Higher Educational Association (THEA). Workstream 1, 'Transforming the Learner Experience through Student Empowerment', builds on findings from the 'NEXT STEPS for Teaching and Learning' report (National Forum for the Enhancement of Teaching and Learning in Higher Education, 2021), which considers what the Irish HE sector has learnt from the experience of the COVID-19 pandemic. Work-package 1.1 of this stream 'Sustainable pathways to higher education' focuses on providing opportunities for learners through flexible course provision and support.

Micro-credentials offer considerable opportunities for flexible learning, particularly in response to demands for specific skills. Serving regional development needs has long been part of the technological higher education sector's mission. This needs analysis was conducted to identify regional skill demands and review the micro-credentials currently offered by higher and further education. A beta[1] level information needs analysis was used in the methodology. Data were primarily collected using publicly available information (i.e., desk research), which was complemented with primary data collected from the seven N-TUTORR institutional leads via an MS forms survey and working group discussion.

"1. A Beta level information needs analysis is appropriate when the purpose is to "...analyse output gaps when there is certainty with respect to the system's goals, objectives and policies" (Dorner et al., 2017, p.50)"

Findings are presented in three sections: a literature summary on micro-credentials in higher education (Section 3), the micro-credential landscape in Ireland (Section 4) and an overview of Ireland's skill demands (Section 5). To summarise key findings:

- There is no general consensus of a definition or conceptual framework for micro-credentials amongst the TU sector, although all are currently developing policies,
- Incentives for higher education institutions to implement micro-credentials include responding to industry needs and increasing learner flexibility,
- Challenges in implementing micro-credentials in Higher Education are largely due to lack of consistency, working frameworks and policies
- There is a wide range of short learning experiences offered by the third level sector in Ireland with a variety of duration, credits, format and topic,
- Three global megatrends; climate change, digital transformation and circular economy, strongly influence Ireland's national skill needs
- Business, Engineering, ICTs, and Construction are key growing, industries with increasing skill demands across most regions in Ireland
- Whilst global megatrends heavily dictate Ireland's national skills needs, there is some variance between individual regions, which are shaped by geographic and socio-economic factors specific to each region,
- Subsectors with underserved skill needs include applied construction skills, computer-aided design in engineering and film production, and high-level culinary skills,
- Transversal skills, such as project management, communication and foundational digital skills, continue to be sought by employers.

The report concludes with **proposed recommendations for shared practice and development of micro-credentials within the TU sector** (Section 6)

Methods & methodology

2

2 Methods & methodology

2.1 RESEARCH QUESTIONS AND OBJECTIVES

The overarching research questions guiding this work were: What is the current landscape of micro-credentials offered by the higher education sector in Ireland, and in what ways can the TU sector address underserved industry needs, including regional-specific needs?

This was underpinned by the following objectives (OB):

- **OB1:** Conduct a mini literature review on micro-credentials in higher education,
- **OB2:** Provide an overview of micro-credentials offered in higher education in Ireland distinguishing between traditional universities, Technological Universities (TUs) and Institutes of Technology (IoTs), and the Further Education and Training (FET) sector
- **OB3:** Generate a list of current industry/employment needs (skills/knowledge), including regional specific needs
- **OB4:** Provide recommendations to inform the curation of a suite of seven micro-credentials (one from each N-TUTORR partner institution) delivered by TU/IoT partners that could be offered a an N-TUTORR programme

2.2 METHODOLOGY

To address the research questions and complete these objectives, an information needs analysis methodology was employed. Dorner et al. (2017, p.10) define information needs analysis as:

> ***"...the process of making value judgements regarding solutions to an information-related problem faced by a client group, service provider or facility in order to facilitate fulfilment of a necessary, useful and defensible purpose"***

Taking this needs analysis lens, we defined the following components in this research context:

1. Information-related problem: we hypothesise that there are industry skill needs currently being unmet by either traditional qualifications' or the current offering of micro-credentials by higher education institutions
2. Service provider: the Technological Universities (TU) and Institutes of Technology (IoTs)
3. Desired purpose: develop a pilot suite of micro-credentials to address an identified specific industry skill needs gaps.

More specifically, a beta needs analysis approach was used to assess the current offering of micro-credentials in the TU sector and to identify potential gaps (Dorner et al., 2017, p.50). A beta needs analysis is appropriate when the purpose of the analysis is to '...analyse output gaps when there is certainty with respect to the system's goals, objectives and policies' (Doner et al., 2017, p.50). The focus of a beta needs analysis is on the output gaps of current programmes, services or products, which aligned with the underpinning research question here.

2.3 NEEDS ANALYSIS STAGES

This work was shaped by two stages: (i) desk research and (ii) primary data collection (Figure 1). As is typical of information needs analysis work, these stages were not linear and indeed were recursive when necessary (Dorner et al., 2017). How these stages related to achieving the objectives will be now be described.

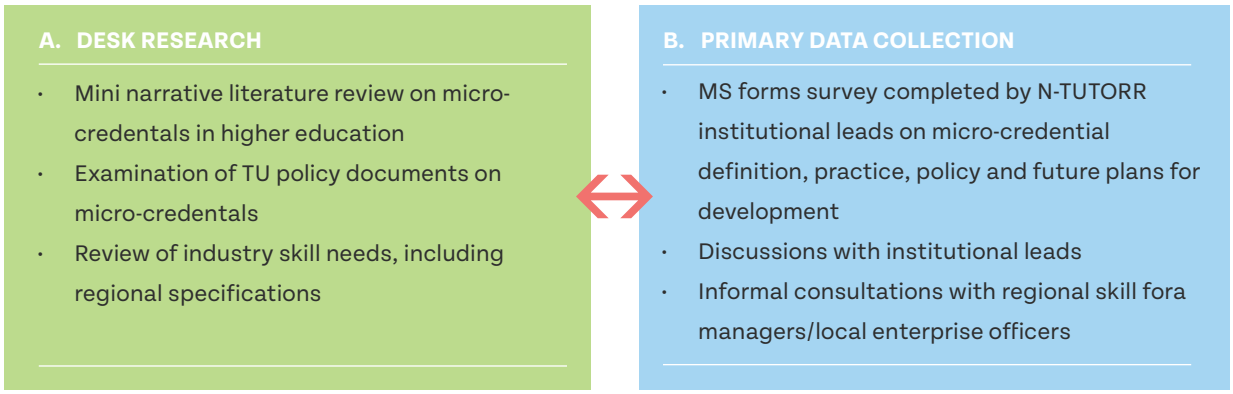


Figure 1. Needs analysis stages. *A. Desk research. B. Primary data collection.*

2.3.1 Literature summary

First, to provide a snapshot of the current landscape of micro-credentials in higher education in Ireland (OB1), a mini narrative literature review was conducted (Figure 1A: Desk research). Four databases were used: Eric, ESRI, Taylor and Francis, and Wiley Online. The search terms used were: (Microcredentials OR micro-credentials OR microcreds) AND "higher education". Results were limited to those published in the last five years. Where possible, results were also filtered to limit 'Microcredentials' to the title and 'higher education' to anywhere in the text. Furthermore, where possible results were also limited to European locations, as it was the area of interest and the search results for Ireland specifically were very scarce. The applied exclusion criteria were: (i) papers that described learning that took place outside of Higher Education Institutions and (ii) opinion pieces.

Table 1. Literature review search results. *'Retained' refers to publications that were retained after the exclusion criteria had been applied. 'Microcreds' refers to all search terms related to micro-credentials.*

DATABASE	ALL RESULTS	<5 YEARS	RETAINED	SEARCH NOTES
Wiley Online	6	5	2	Microcreds (Title), Higher Education (Anywhere)
Taylor and Francis	7	7	7	Microcreds (Title/Abstract), Higher Education (Abstract)
ESRI		26*	6*	No results for microcreds. Used higher education only and selected publications with a title that referenced improving education at HE, digitalisation or certifications
ERIC	38	34	13	All terms anywhere in document
TOTAL			**26**	

**A different search strategy was employed here, see search notes.*

2.3.2 Generating a list of existing micro-credentials

To generate the initial list of micro-credentials currently available in the HE sector in Ireland (OB2), institution websites and associated sources were reviewed (Desk research: Figure 1A, see Table 2 for list of information sources). Where applicable, TU policy documents were examined to explore micro-credential policies (Figure 1A).

To complement the information compiled from the desk research, primary data were collected from relevant stakeholders (Primary data collection: Figure 1B). In this data collection, the institutional leads for each N-TUTORR institutional partner acted as conduits and collators of information. An MS forms survey (*N* = 8 responses) was sent to each N-TUTORR institutional lead. Institutional leads could either send the survey link to the identified subject matter experts that were best-placed in their institution to answer the questions, or gather the requisite information and then complete the survey on behalf of the institution. The MS forms survey was designed to collect information relating to micro-credential policy and usage at their host institutions (Figure 1B, see 9 Appendix for MS forms survey. In one case, two subject matter experts in the institution complete the survey), and as such, the number of responses (*N* = 8) exceeds the number of institutional leads (*N* = 7). For this case, responses regarding the same institution were merged to represent one response. The responses to this MS forms was used to guide a follow-up discussion meeting with the institutional leads. Preliminary findings of this needs analysis were discussed to signpost next steps and redefine objectives.

Table 2. Information sources for micro-credentials and regional skills.

INFORMATION TYPE	MICRO-CREDENTIALS	REGIONAL SKILLS
Report/policy	Institutional policy documents on micro-credentials	• National skill strategy • Regional enterprise strategies 2022-2024
Traditional Literature	Mini literature review	None sought
Consultations	• N-TUTORR institutional leads • IUA Micro-Creds project	• Regional skill fora managers • Business skills for a • Local enterprise offices
Websites	IUA: Microcreds.ie FET: irq.ie, fetchcourses.ie	• Westerndevelopment.ie • Regionalskills.ie
Database	None	Cedefop OVATE skills

2.3.3 Generating a list of industry skill needs

To generate a list of industry skill needs (OB3), first the national skills strategy document for 2022-2024 and the recent OECD report were reviewed to identify the main priorities for Ireland's skill needs nationally. Next, to incorporate region-specific needs, the regional enterprise strategy documents for each NUTS III region were reviewed to identify important/growing industry sectors (Desk research: Figure 1A). This initial list was complemented via informal consultations with regional skill forum managers (where possible) and adjusted accordingly (Primary data collection: Figure 1B).

Finally, the findings from objectives 1-3 were integrated (Section 6) to provide recommendations (Section 7) to inform the N-TUTORR progamme team on the curation of a suite of micro-credentials to address identified skill gaps.

Mini literature review: Micro-credentials in Higher Education

3

3 Mini literature review: Micro-credentials in Higher Education

3.1 THE RECENT RISE OF MICRO-CREDENTIALS IN HIGHER EDUCATION

The current 'fourth industrial revolution' has been a driving factor of various transformational changes in the higher education landscape (Cedefop, 2022), illustrated by the recent rapid digitalisation of teaching and learning. This, along with the global 'on-lining' incurred by the COVID-19 pandemic, acted as a catalyst to shift pedagogy from traditional in-person modalities to exploring alternative online methods. Along with this pedagogical shift has come a rapid increase of 'micro-credentials'; certificates that are awarded to students after completing a short learning course (Cedefop, 2022; Ha Thi Ngoc et al., 2022). It has been estimated that in the U.S alone there are over 500,000 micro-credential courses (FutureLearn 2019, as cited by Oliver 2019). As noted by (Brown et al., 2021) more than half 54% of the literature on micro-credentials was published in the last two years.

However, as saliently noted by Oliver (2019) 'Short courses are not new' and have been offered by many higher education providers worldwide, for some time. In Ireland, Special Purpose and Supplemental awards have been offered for many years by the institutes of technology. Although we see the term 'micro-credentials' from 2013 onwards (Brown et al., 2021), a recent report by Cedefop (2022) showed that, amongst the 22 countries examined, few had a common term or definition for micro-credentials at the national level, even if they had a history of offering short-term accredited learning experiences. Instead, Cedefop (2022) identified a range of terms used to refer to certifications with 'micro-credential' properties, such as digital badges, module certificates, partial qualifications, micro-certificates and supplementary qualifications (see Cedefop, 2022, for a complete list of terms used in different countries).

3.2 DEFINITION OF MICRO-CREDENTIALS

In the last few years there have been numerous attempts between scholars and policymakers to agree on a consistent definition of micro-credentials (Gauthier, 2020; Van Der Hijden & Martin, 2023). Often cited, Oliver (2019, p.5) defined micro-credentials as "...a certification of assessed learning that is additional, alternate, complementary to or a formal component of a formal qualification". Other definitions have mirrored the idea that a micro-credential is a short learning certificate that could be part of a larger degree e.g. "...a sub-unit of a credential that confers a minimum of 5 European Credit Transfer and Accumulation System (ECTS) and could accumulate into a more significant credential or be part of a portfolio." (Varadarajan et al., 2023, p.2). Adding confusion to the matter, the term micro-credentials can also be used to refer to the short learning experience itself, rather than the associated certificate, as done by Pavlik (2021) : "Microcredentials are short programs that allow learners to gain particular skills or competencies". Although numerous definitions have been proposed, a worldwide consensus has not yet been reached. However, the European Commission (European Commission, 2022, p.13) recently defined micro-credentials as:

> ***'Micro-credential' means the record of the learning outcomes that a learner has acquired following a small volume of learning. These learning outcomes will have been assessed against transparent and clearly defined criteria. Learning experiences leading to micro-credentials are designed to provide the learner with specific knowledge, skills and competences that respond to societal, personal, cultural or labour market needs. Micro-credentials are owned by the learner, can be shared and are portable. They may be stand-alone or combined into larger credentials. They are underpinned by quality assurance following agreed standards in the relevant sector or area of activity'***

This definition has also been adopted by Quality and Qualifications Ireland (QQI, 2021), the IUA MicroCreds project (see Section 4.2) and by some Technological Universities (see Section 4.4.2). As such, it is the definition that will be used for the remainder of this report.

3.3 CHARACTERISTICS OF MICRO-CREDENTIALS

Although there are a range of proposed definitions for micro-credentials, there are certain components that are common to many, such as notions of being (i) records of obtained skills or learning outcomes, (ii) associated with a short learning experience, (iii) associated with a notional workload. The most common delivery mode is Classroom-based (Cedefop,2022), which is surprising as micro-credentials are often conflated with digitalisation of teaching and learning. Assessment of learning outcomes in micro-credentials is usually done in-house by providers (Cedefop, 2022).

There is some debate in the literature regarding the range of the associated notional workload. Varadarajan et al. (2022) noted that the notional workload and/or credits associated with micro-credentials vary between institutions and geographical contexts. For example, the MicroHE project, European ThinkTank, has recommended a minimum of 5 ECTS (Brown et al., 2021). Yet, Pickard, Shah and DeSimone (2017, as cited in Brown et al., 2021) proposed that it is any credential that '...covers more than a single course but less than a full degree'.

Another characteristic that is often discussed in the literature is the 'stackability' of micro-credentials. The term 'stackability' refers to "...the certification of learning that can be accumulated into a larger credential or degree" (Cedefop p.63). According to Kazin & Clerkin (2018), there are three types of stackability (Figure 2):

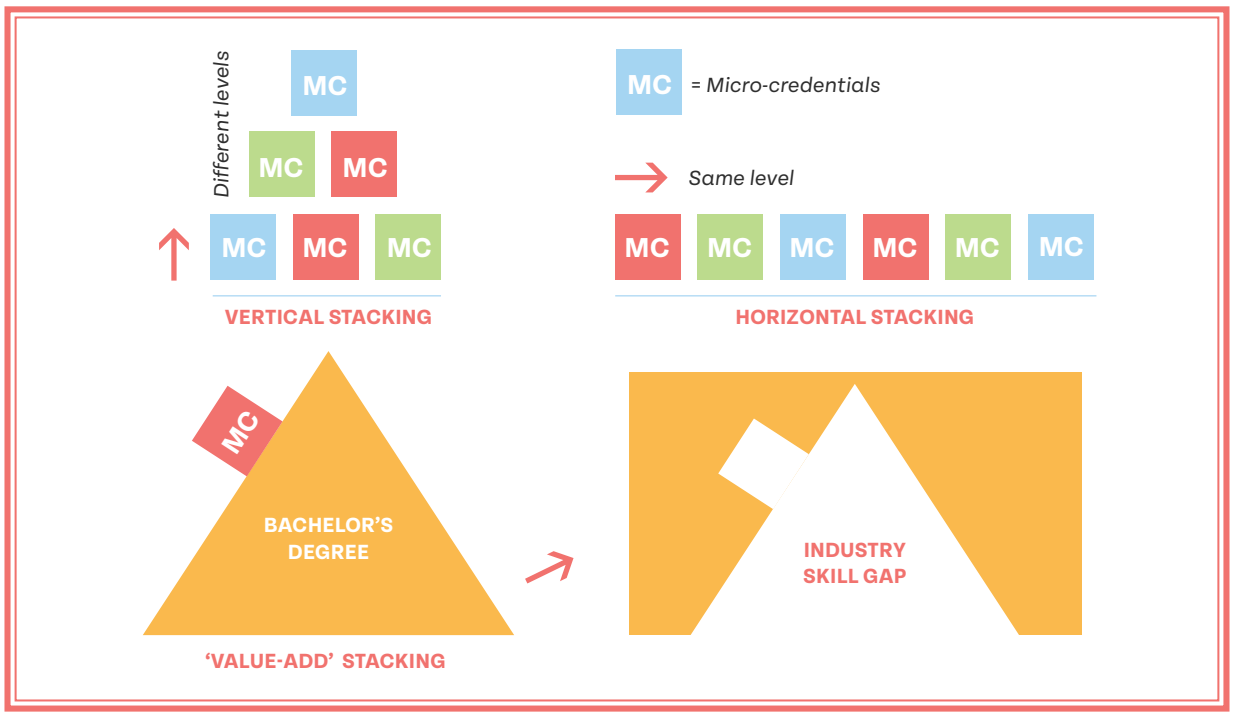


Figure 2. Three types of stackability in micro-credentials. *Informed by Kazin & Clerkin (2018) classification. Figure created for this report.*

- Vertical stacking: credentials are added to each other in a hierarchy, with one level building on another, which allows learners to progress towards a higher degree (e.g. bachelor's degree to master's degree)
- Horizontal stacking: related credentials are combined on the same level
- Value-added stacking: combines components of vertical and horizontal stacking and is particularly useful for making minor yet valuable additions to larger degrees to better fit learners to rapidly changing industry needs.

An example of value-added stacking would be where a learner could add patient care technician and phlebotomy certificates to an associate degree to enable entry into a position as a medical office administrator (Kazin & Clerkin, 2018, p.8).

Eighty-eight percent of VET providers report that their micro-credentials are stackable (Cedefop, 2022). Cedefop (2022) have suggested that the stackability of micro-credentials has been driven by the modularisation of programmes, especially in VET programmes. Stackability also is perceived to hold economic benefit; in a Delphi study examining critical benefits and driving factors of micro-credential implementation across users, it was noted that "Educational ecosystems based on stackable micro-credentials involving universities, employers and MOOC providers will enhance educational offerings and create new markets" (Pirkkalainen et al., 2023, p.51).

The European Consortium of Innovative Universities (EICU) stipulates that stackable micro-credentials must have a '...value in itself', i.e., be a standalone proof of learning (EICU, 2020, p.1. *as cited in* Cirlan & Loukkola, 2020). Thus, whilst micro-credentials may have the potential to combine with other credentials to form a larger degree, this may be viewed as an optional characteristic. To clarify the debate in the literature on the necessary components of micro-credentials, the European Commission (2022) proposed that to be considered a micro-credential, a certificate should contain the following pieces of information:

- Identification
- Title
- Awarding body
- Learning outcomes
- Form of participation
- Notional workload (in ECTs if possible)
- Stackability (optional)

In this characterization, the common components can be surmised as a certification awarded upon obtainment of learning outcomes associated with a short learning experience with a clearly defined notional workload. The micro-credential must act as a standalone unit, and stackability is optional.

3.4 MICRO-CREDENTIALS AND DIGITAL BADGES

The term 'micro-credential' is often used conflated or interchangeably with 'digital badge' (Brown et al., 2021). However, digital badges are a type of digital credential that fall under the larger category of micro-credentials. In other words, all digital badges can be considered micro-credentials, but not all micro-credentials are digital badges (Cedefop, 2022). Like all micro-credentials, digital badges are certificates that provide tangible proof to prospective employers on skills/competencies that a learner has obtained after completing a short learning experience (Cedefop, 2022). They are often represented by an image that can be hosted in platforms such as LinkedIn. One of the most useful features of digital badges, is that this image is embedded with metadata comprising details associated with the badge, such as awarding institution, and the criteria for obtaining the badge (Ahmat et al., 2021; EDUCAUSE, 2019).

Digital badges are typically not credit-bearing. For this reason, Brown et al. (2020), specifically described digital badges as "nano-credentials', which are a type of unbundled, non-credit bearing micro-credential. This needs analysis report is to inform the curation of a suite of seven accredited micro-credential modules, between 5-10 ECTs. Therefore, the needs analysis described in this report, in particular the stage which gives an overview of micro-credential provision in Ireland (Section 4), excludes digital badges.

3.5 BENEFITS OF MICRO-CREDENTIALS

It has been recognised that implementing micro-credentials in Higher Education can have numerous benefits for both education providers, learners, and employers. A Delphi study looking at micro-credential impacts and drivers by Pirkkalainen et al. (2023) indicated that micro-credentials may provide more flexibility for students, support the recognition of skills and competencies, allow universities to explore new ways of co-creating learning experiences together or with other stakeholders, and thus create more 'stackable' certificates, increasing permeability between award bodies (Pirkkalainen et al., 2023). Implementing micro-credentials can also support new models of pedagogy, reduce costs (Jansen and Schuwer, 2015, p.15, *as cited in* Cirlan & Loukkola, 2020) and increase university enrolment and increase university responsiveness to labour markets (Ha Thi Ngoc et al., 2022).

For learners, the Delphi study proposed that micro-credentials may improve student employability – both decreasing 'skills mismatch' and helping students prepare for jobs of the 'future', increase student motivation, assist learners to verify obtained skills, improve inclusive practices (Pirkkalainen et al., 2023). Many of these proposed benefits have been supported empirically, including increasing student motivation and student-centred learning, increased flexibility for learning (Brown et al., 2021; Ha Thi Ngoc et al., 2022; Varadarajan et al., 2023), promotion of life-long learning (Cedefop, 2022; Varadarajan et al., 2023), increased employability, development of 21st century transversal skills, and increased access and pathways to formal education (Varadarajan et al., 2022). This increased flexibility and accessibility for student learners is partly facilitated by the 'unbundling' feature of micro-credentials, which allow for content to be separate into individual components (Pirkkalainen et al., 2023). In fact, increasing flexibility for students was seen as the most important possible benefit by a panel of European experts in a Delphi study by (Pirkkalainen et al., 2023). Regarding increased employability, Ha Thi Ngoc et al. (2022) reported in a systematic review that the most commonly cited job-related benefits of micro-credentials were developing professional competencies, preparing for job search and career exploration, building a professional network, and understanding industry practices.

Many of these cited benefits align with the 'strategy student-centered goals' stipulated by the current National Access plan (Higher Education Authority, 2022) suggesting that implementing micro-credentials at higher education may be an effective strategy to achieve these goals. Improving learner flexibility and facilitating lifelong learning are two particular goals that span across governmental and higher education strategies. As highlighted by the OECD (2023), aspiring adult learners cite obstacles such as family reasons, schedule and costs (Eurostat, 2016 *as cited by* OECD 2023). This suggests that the flexible and short learning experiences that micro-credentials can offer may help to alleviate such obstacles and widen access to learners.

3.6 EMPLOYER PERSPECTIVES OF MICRO-CREDENTIALS

The labour and employment market is dynamic with rapidly-changing needs of employers. It has been estimated that within the next 5 years, more than half of the current workforce will need to upskill to meet industry deficits (European Commission, 2020). As noted by BusinessEurope (2022, as cited by Van der Hidjen et al. 2023, p. 13), offering micro-credentials to learners may be a way for Higher Education institutions to widen access and offer more "...labour market relevant education and training...". The rising implementation of micro-credentials within both the public (e.g., higher education institutions) and private (e.g., industry employers using CPD modules) sectors has also contributed towards an increased permeability between these two sectors, as employers and higher education institutions alike look towards micro-credentials as a tool to bridge graduate-employee skill gaps that may be overlooked by traditional qualifications (Cedefop, 2022). In fact, 54% of education and training providers survey across Europe indicated responding to specific needs of employers as a main reason for offering micro-credentials to their learners (Cedefop, 2022). Micro-credentials offer a way for students to upskill in the areas currently in demand without incrementing huge costs of time and/or money compared to traditional degrees to learners, whilst providing proof of competencies for employers (Gauthier, 2020). For employers, there are numerous cited opportunities offered by micro-credentials, such as fulfilling employer demands, acknowledgement of skills, promote sustainable development goals, Future of work and skills and closing the gaps in response to the change nature of work (Varadarajan et al., 2023).

However, in terms of challenges, many employers express concern about the lack of consistency regarding the quality and assigned notional workload of micro-credentials (Varadarajan et al., 2023). About a third of employers featured in the review expressed concerns about fraudulent micro-credentials. Both highlight the need for higher education institutions to audit their current portfolio of micro-credentials to ensure that they meet the requirements suggested by the European Commission (2022), to maximise authenticity, transparency and trust by employers (Cedefop, 2022), and therefore increase their value to learners. This concern around maintaining learning quality is also echoed by education providers, as ill-designed micro-credentials was a commonly found theme across literature (Ha Thi Ngoc et al., 2022). Indeed, ensuring high quality was determined to be the most important driving factor for higher education institutions in implementing micro-credentials (Pirkkalainen et al., 2023). This emphasises the importance of aligning micro-credentials notional workloads with European quality standards such as ECTS.

Although micro-credentials have been cited as increasing employability for learners (Varadarajan et al., 2023), a recent Irish survey of employers found that 80% of employers had 'never' or only 'sometimes' encountered job applications mentioning them (Brown et al., 2021). This suggests that learners may not see the potential value of including them in applications. In addition, recent surveys carried out with employers across Europe have

indicated that employers were not aware of the term micro-credential (Brown et al., 2021; Cirlan & Loukkola, 2020). In an Irish survey 49% of employers surveyed had heard of the term 'micro-credential', however only 43% agreed/strongly agreed that they were 'knowledgeable' about micro-credentials (Nic Giolla Mhichíl et al., 2020), demonstrating the rapid influx of micro-credentials in the landscape yet highlighting the potential misalignment of perspectives between higher education institutions and employers. This is in agreement with a systematic review by Ha Thi Ngoc et al. (2022) which found that employers were more uncertain about micro-credentials than students. Furthermore, across the 29 international articles examined, only one article examined student and employer awareness. Consequently, Ha Thi Ngoc and colleagues strongly recommended that future work in micro-credential development and facilitation take stakeholder awareness into consideration.

3.7 CHALLENGES OF IMPLEMENTING MICRO-CREDENTIALS IN HE

In addition to the numerous benefits associated with implementing micro-credentials in Higher Education, the literature also describes a series of challenges (Table 3). These challenges can be grouped into three categories: lack of consistent frameworks, high level of resources required for effective implementation and uncertainty of value (Table 3). Most of these challenges may be addressed with cohesive collaboration across the HE sector in agreeing upon consistent definitions, working frameworks and implementation strategies. Brown et al (2023) recently outlined a series of questions which leadership in HE may use to guide their policy design and implementation around micro-credentials. These challenges also highlight the importance of conducting skill audits or needs analyses of industry skill needs to ensure that any offered micro-credentials are indeed addressing a needed skill gap, which is often a standard feature of programme approval in the technological university sector. Moreover, to ensure a cohesive vision and understanding to achieve maximum value and benefit to all stakeholders, there needs to be increased permeability between higher education and industry. In practice, increased permeability may look like increased collaboration, co-creation or regular practice and knowledge exchange between these sectors.

Table 3. Challenges of implementing micro-credentials in HE. *Challenges identified from literature are grouped into common categories*

CHALLENGE ASSOCIATED WITH IMPLEMENTING MICRO-CREDENTIALS IN HE	SOURCE CITATION(S)
1. Lack of consistent frameworks	
Lack of trust in micro-credentials	*(Mcgreal et al., 2023; Pirkkalainen et al., 2023)*
Missing implementation strategies	*(Brown et al., 2023; Mcgreal et al., 2023; Pirkkalainen et al., 2023)*
Lack of consistent definition and structures	*(Brown et al., 2023; Mcgreal et al., 2023; Pirkkalainen et al., 2023)*
Lack of common recognition frameworks	*(Pirkkalainen et al., 2023; Van Der Hijden & Martin, 2023)*
2. High level of resources required for effective implementation	
Managing potentially huge amounts of online learners	*(Ahmat et al., 2021)*
Time and skills to design effective courses	*(Ahmat et al., 2021)*
3. Uncertainty of value	
Lack of job market studies to identify industry skill gaps	*(Pirkkalainen et al., 2023)*
Inconsistent understanding between HE and employers	*(Ahmat et al., 2021)*
Concern of decreasing value and enrolment in traditional degrees	*(Ahmat et al., 2021)*
Perceived low quality (due to lack of frameworks	*(Van Der Hijden & Martin, 2023)*
Concern that short courses will lead to fragmented learning	*(Van Der Hijden & Martin, 2023)*
Uncertainty about the value of micro-credentials to the labour market	*(Van Der Hijden & Martin, 2023)*

3.8 MICRO-CREDENTIALS AND THE DIGITAL DIVIDE

There is no denying that digitalisation, accelerated by proven concepts demonstrated during the 'onlining' of the COVID-19 pandemic, plays a major role in both developing and facilitating micro-credentials. A systematic review of literature related to micro-credentials (including digital badges, MOOCs, and professional certificates) between 2012 and 2022 demonstrated that online delivery was the most common facilitation method (Ha Thi Ngoc et al., 2022).

Indeed, as indicated by this needs analysis (see section 4.2) the majority of micro-credentials offered by the IUA MicroCreds project are facilitated at least partly online, with half being delivered '100% online'. Whilst micro-credentials may offer a solution to increasing lifelong learning, flexibility and addressing skill gaps, for some they may serve to widen an already existing 'digital divide'. The 'digital divide' can be described simply as the 'have and have-nots' in relation to access to internet and technology and possession of digital-related skills (Accenture, 2020). In a survey asking for the main obstacles to accessing the internet and services, 42% cited poor internet connection and 24% cited having no internet access at all (Accenture, 2020). Regional disparity was also identified, with 50% of respondents from Connacht and Ulster citing poor internet connections, compared to 37% in Dublin (Accenture, 2020). This disparity is in juxtaposition with a cited aim of micro-credentials to widen participation and improve digital skills of learners. Out of the 240 MicroCreds offered by the IUA MicroCreds partner universities, 9 contain the word 'digital' in the title, named filed under Business and management (n = 5), Healthcare and medicine (n = 2), Humanities and languages (n = 1) and IT and computer science (n = 1). Out of these 9, only one micro-credential, 'Digital disruption and transformation' (UCC), is facilitated on-campus, necessitating reliable access to internet to complete the remaining 8 MicroCreds. Therefore, access to internet and level of digital skills of the intender learner is an important aspect to consider in the development and delivery of any micro-credential course.

The micro-credential landscape in Ireland

4

4 The micro-credential landscape in Ireland

4.1 RECENT STANDARDIZATION OF A LONG-STANDING TRADITION

In Ireland it has been recognised that offering short-term learning courses is a long-standing tradition (Cedefop, 2022), illustrated by the various terms that have been in use in recent years to refer to certificates for short-term learning courses, such as micro-qualifications, digital badges, minor awards, special-purpose awards and supplemental awards (Cedefop, 2022). As noted by the QQI (2021, p.7), there are "high levels of collaboration between employers and both HE and FET institutions to deliver this type of training". Moreover, QQI certification data indicates that micro-credentials are typically completed by learners for work-related reasons, as they focus on narrow components of a learning area. For example, a certificate in 'Payroll technique', delivered by the Irish Payroll Association, is the most completed micro-credential (accredited under 30 ECTs) on the Irish Registry of Qualifications, accounting for an average of 64% of certificates completed between 2014-2020 (QQI, 2021).

Short courses have been an established part of the National Framework of Qualifications (NFQ) since 2003, mainly through IVET programmes (Cedefop, 2022). Most recently there has been considerable national effort to increase offerings of micro-credential courses in higher education and to achieve a level of standardization and alignment to employment needs. In January 2021, the qualifications authority defined micro-credentials as "... units of assessment that are smaller than traditional programmes of learning such as degrees and diplomas" (QQI, 2021). Under this definition, digital badges are a type of digital credential and have been referred to as micro-credentials (Cedefop, 2022), but have also been defined as conceptually distinct 'nano-credentials' (Brown et al., 2021). Later that year in December 2021, the QQI's Programmes and Awards Executive Committee (PAEC) approved new micro-credential courses using a new streamlined approach for rapid validation of micro-credentials arising from programmes that had already been validated (QQI, 2021).

Despite the long-standing tradition of micro-credentials in Ireland, they are not yet uniformly established in higher education institution policy documents. In an analysis of policy documents in 22 countries across Europe, Cedefop (2022) reported that SOLAS, the state agency responsible for further education and training, appears to have the first mention of micro-credentials in their 2020-2024 strategy.

This report considers the offering of micro-credentials, and short courses that may qualify as micro-credentials, by three branches of the third level education and training sector: the seven universities of the Irish Universities Association (IUA), the Technological Universities (TUs), Institutes of Technology (IoTs), and the Further Education Training (FET) sector. This report also focuses on short courses that are accredited between 5-10 ECTs. For a more comprehensive analysis of micro-credentials delivered by HE in Ireland, including minor/major awards, supplemental and special purpose awards, ranging from 1-30 ECTs, readers are directed to the QQI (2021) report.

4.2 IUA - MICRO-CRED PROJECT

In 2020, the IUA and the seven partner universities launched their five-year collaborative micro-credential project, 'MicroCreds' (IUA, 2023). This €12.3 million project aimed to develop, pilot, and evaluate building blocks for a transformation in lifelong learning through micro-credentials. Central to MicroCreds is a sustainable model of enterprise engagement for micro-credentials called MicroCreds Innovate, which explores enterprise-informed development and emerging skill needs in order to "anticipate, understand and respond to emerging skills needs at a granular level" (IUA, 2023). The project was awarded funding under the Human Capital Initiative, which aims to provide additional capacity in higher education to meet enterprise's priority skill needs (IUA, 2023).

Since its launch, the MicroCreds project had established an online platform, MicroCreds Explore (https://microcreds.ie/) where users can search for Micro-credential courses, filtering their search according to subject area, subtopic, delivery mode (i.e. 100% online versus hybrid), course duration, and host university. This work presents an overview of these available modules, based on information obtained from the website. As of May 2023, there are 240 micro-credentials available, associated with 12 subject areas (Table 4). 'Business and management', 'Healthcare and medicine', 'IT and computer science', 'Science and engineering' and 'Law' represent the subject areas with the highest number of micro-credentials currently available (Table 4), possibly reflecting their relative skill demands in Ireland.

However, these numbers may vary slightly than what is shown, as the MicroCreds modules seem to have several tags associated with them when using the search function i.e. the same module may appear for when searching for 'Business and management' and 'Health and medicine'. Moreover, there seems to be some ambiguity between how similar-sounding MicroCreds are assigned a subject area. For example, there are two MicroCreds called 'Data analytics with R'; one is delivered by UL (tagged Business and Management) and another is delivered by UCD (coded IT and computer science).

These 13 topics are further categorised into 82 subtopics. For example, 'Business and Management' has 13 subtopics, including 'Business and business admin', 'Marketing and advertising' and 'Digital, data and analytics' (Figure 3). The median number of subtopics within a topic is five. 'Humanities and languages' have the least number of subtopics, two, with 'Languages' and 'Humanities'. Although subtopics may be in place, some subtopics have no micro-credentials associated with it using the 'Explore' function on the website e.g. 'Community Law' within 'Law' (Figure 3). Notable areas with fewer or no associated micro-credentials include Project Management (n = 1), Green energy and sustainable technology (n = 3), Building and civil engineering (n = 2), Brewing and Distilling (n = 1), Virtual reality (n = 0), Film Production (n = 0), Statistics (n = 0), and Education leadership and management (n = 0).

Subject	
Business & management	69
Healthcare & medicine	59
IT & computer science	30
Science & engineering	24
Law	19
Humanities and languages	8
Social work and welfare	8
Agriculture & food systems	7
Food & nutrition	5
Creative arts, media & culture	4
Teaching and education	4
Math, economics & statistics	3
Total number	**240**

Table 4. Count of MicroCreds micro-credentials per subject area. *Counted from IUA MicroCreds website for this report (May 2023)*

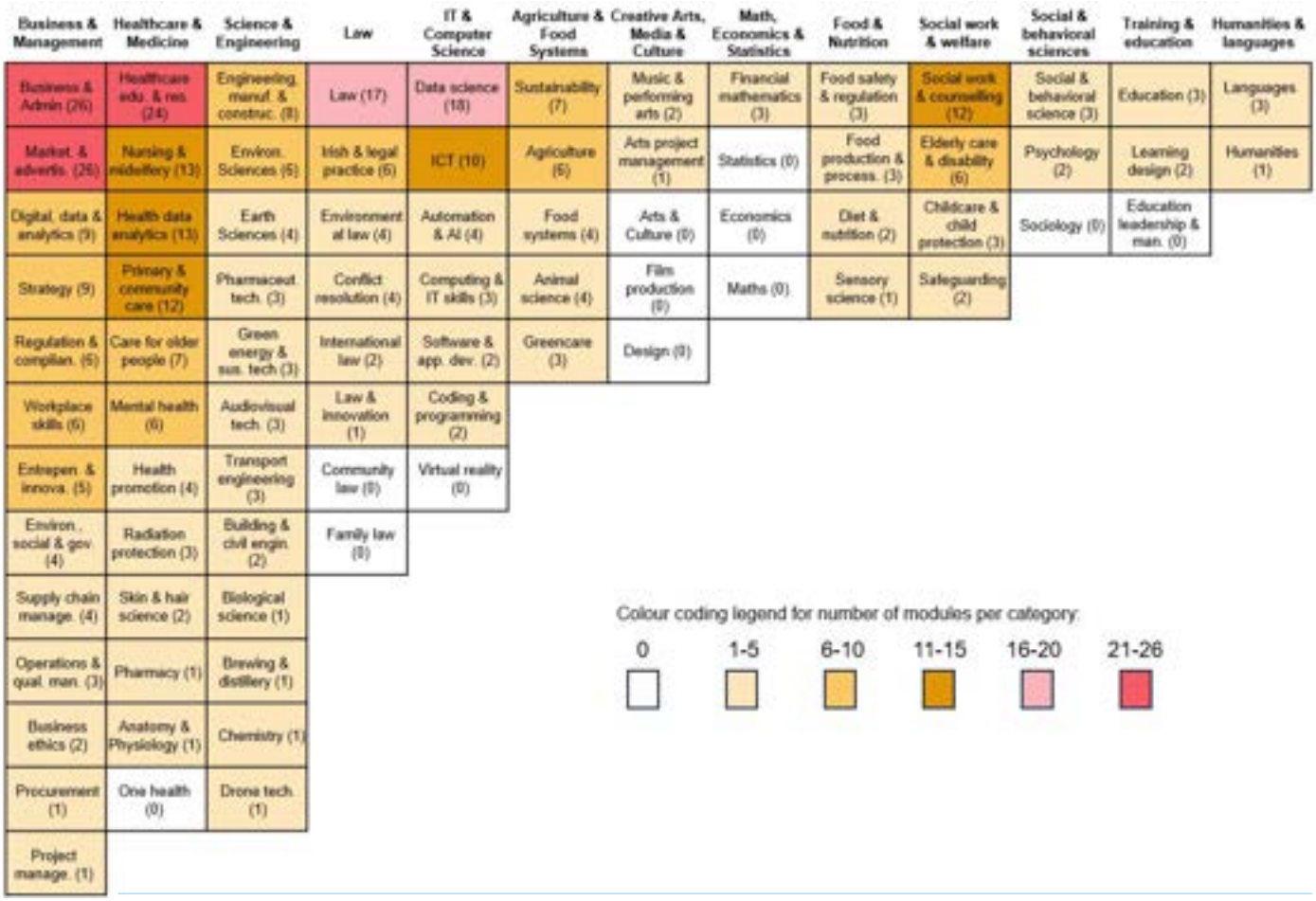


Figure 3. **Analysis of distribution of IUA MicroCreds across topic and subtopics.** Shows number of MicroCred micro-credential modules that appear when a user searches under each subtopic on the microcreds.ie website. Micro-credentials appear to be associated with multiple subtopics, so the sum of micro-credentials here (N = 374) is greater than the sum of micro-credentials available (N = 240).

The number of MicroCreds delivered by each institution seems to be reflective of the size of that institution. Most of the MicroCreds are delivered by UCD (n = 74), closely followed by UL (n = 69, 4A). Maynooth University facilitated the least amount of MicroCreds (n = 6, Figure 4A). In fact, Dublin is the county with the highest density of micro-credentials available, facilitated by a combination of UCD, TCD and DCU (n = 112, Figure 4B). The majority of the MicroCreds are facilitated 100% online (50.63%, Figure 5C), closely followed by Blended (35.98%, Figure 4C). A much smaller proportion are facilitated Hybrid (7.11%, Figure 5C) or On-campus (6.28%, Figure 4C). The large proportion of MicroCreds facilitated 100% online may emphasise the existing 'digital divide' (see Section 3.8).

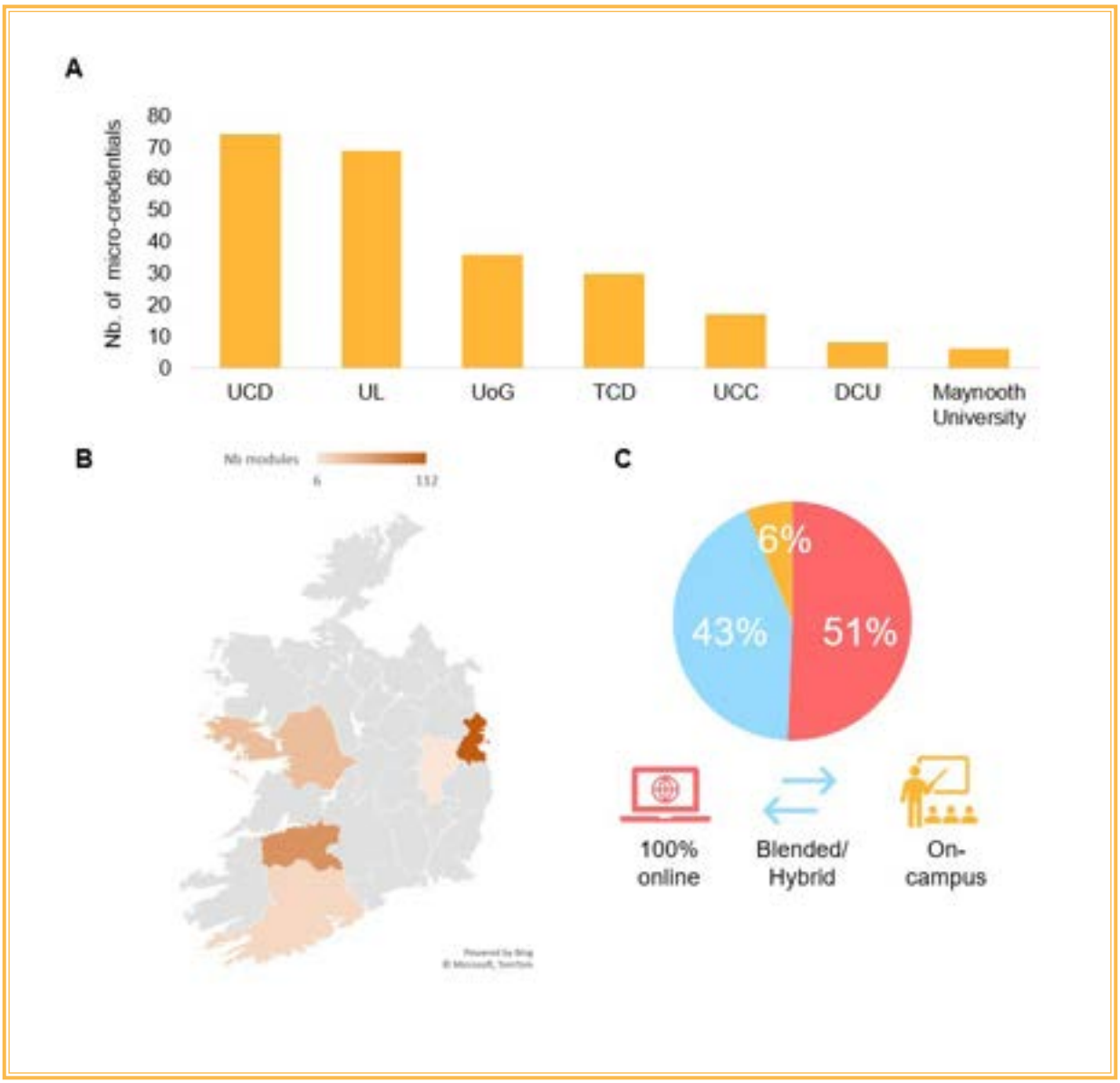


Figure 4. Analytical overview of micro-credentials delivered by IUA MicroCreds. *A. Number of micro-credentials offered by each IUA university. B. Density of MicroCreds by region. C. Delivery format of MicroCreds.*

4.3 THE FURTHER EDUCATION TRAINING (FET) SECTOR

4.3.1 About the FET sector

The Further Education Training (FET) sector in Ireland aims to offer all learners from the age of 16 and upwards to engage in lifelong learning, regardless of any previous levels of education (Government of Ireland, 2020). FET courses and programmes include apprenticeships, traineeships, post-leaving certificate (PLC) courses, community and adult education, and are delivered through the Education and Training Board (ETB) network (Figure 7A), as well as other local providers (ETBI, n.d.). FET provides training courses aligned with levels 1-6 of the National Framework of Qualifications (NFQ), and serve approximately 200,000 learners each year (Government of Ireland, 2020). FET has a longstanding tradition of offering short learning experiences, and with the exception of statutory apprenticeships, the maximum length of a FET course is one year (Government of Ireland, 2020). Across Ireland there are 64 facilities providing levels 5 and 6 education and training, and 293 facilities principally providing levels 1-4 education and training (Government of Ireland, 2020). Level 5 and 6 courses primarily focus on providing vocational training; both facilitating progression to higher education and contributing towards improving employability (Government of Ireland, 2020). In their recent strategy report, FET have recognised the potential of micro-credentials in addressing rapidly changing skills needs, highlight that they will be "important as move into an era of FET provision which can be tailored to meet the needs of learners and employers, and can be made available in bite-size chunks to facilitate accessibility" (Government of Ireland, 2020, p.56).

4.3.2 FET courses available on fetchcourses.ie

To gain an insight into the range of courses offered by the FET sector, the list of courses available on their interactive dataset, fetchcourses.ie, was reviewed. As of May 26th 2023, there were over 7,000 courses listed on the fetchcourses.ie website. Over the course of two hours, the total number of courses available changed three times (7061, 7088, 7105), which may indicate either a flaw in the interactive database, or that the database is regularly updated. Either way, the below review should be interpreted with caution and only high-level conclusions should be drawn. FET courses on fetchcourses.ie are categorised under 11 learning fields (Figure 5), including 'Engineering, manufacturing and construction', 'Business, administration and law' and 'ICTs'.

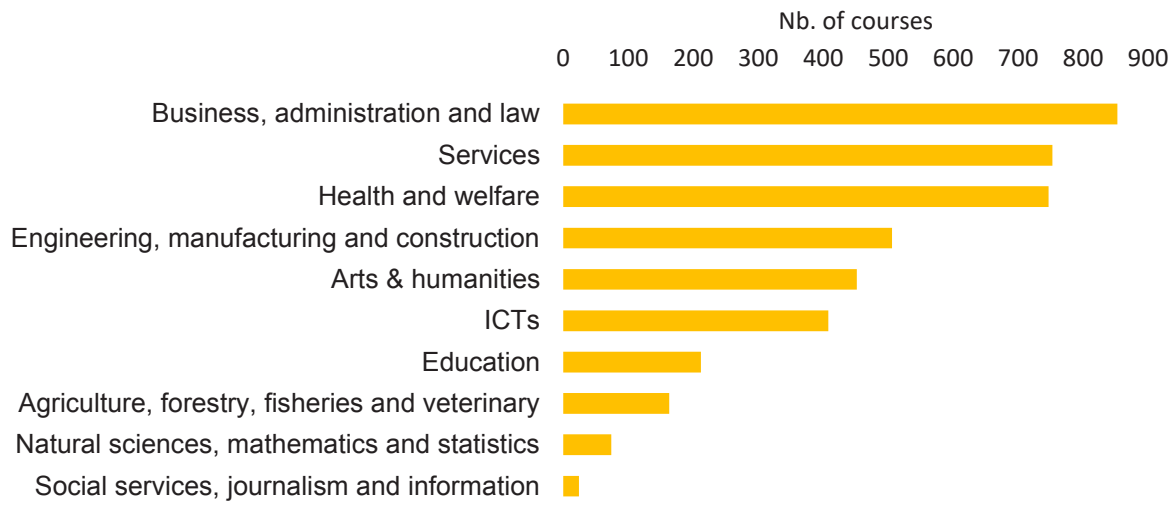


Figure 5. FET courses on fetchcourses.ie according to learning field category. *The category 'Other general learning' (n = 2869) is excluded from this chart. Chart based on data analysis for this report.*

In addition to learning fields, courses can also be filtered through programme category, of which there are 29 (Figure 6), including 'Back to Education Initiative (BTEI) groups', 'Evening training' and 'PLC' courses. BTEI and PLC represent the providers that offer the most and widest range of courses, with at least one course in each category (Figure 6). Surprisingly, there are no courses classified as 'e-learning', but this may be due to a fault of the course classification system and is not to be concluded that none of these courses are available online (Figure 6). 'Evening training' also span a wide range of courses, in particular Engineering, Manufacturing and Construction (Figure 6), which may suggest that these learners are in full time employment and are completing these courses to upskill after work hours.

Programme Categories	Agriculture, forestry…	Arts & humanities	Business, administration and law	Education	Engineering, manufacturing…	Health and welfare	ICTs	Natural sciences…	Other general learning	Services	Social services…	Total
Adult literacy group	0	0	0	0	0	0	2	0	937	3	0	942
Blended training	0	0	2	0	4	0	2	0	0	1	0	9
Bridging and Foundation training	0	0	2	0	1	0	4	0	13	8	0	28
BTEI groups	61	40	190	54	17	281	65	4	252	81	4	1049
Community education	0	0	0	3	1	0	0	0	184	2	0	190
Commnunity training centres	1	0	6	0	2	0	3	0	74	34	0	120
e-learning	0	0	0	0	0	0	0	0	0	0	0	0
ESOL	0	5	0	1	0	0	0	0	606	0	0	612
Evening training	1	8	64	13	140	33	33	0	19	48	0	359
FET Cooperation Hours	0	0	0	0	0	0	0	0	8	0	0	8
FET pathways from school	0	0	0	0	0	1	0	0	5	5	0	11
ITABE	0	0	0	0	0	0	0	0	17	0	0	17
Justice workshop	0	0	0	0	0	1	1	0	12	0	0	14
Libraries training	0	0	0	0	0	0	0	0	0	0	0	0
Local training initiatives	3	2	8	0	2	3	7	0	22	18	2	67
Online eCollege	0	0	7	0	1	0	86	1	0	1	0	96
Other funding	0	0	3	5	15	1	0	0	31	1	0	56
PLC	80	352	357	110	111	344	104	65	52	312	17	1904
Recognition of prior learning	0	0	0	0	0	0	0	0	0	0	0	0
Refugee Resettlement	0	0	0	0	0	0	0	0	9	0	0	9
Skills for work	0	0	1	0	0	0	1	0	22	0	0	24
Skills to advance	0	1	52	13	78	23	24	2	109	18	0	320
Specialist training providers	9	5	30	0	0	1	12	0	92	15	0	164
Specific skills training	0	7	51	4	97	25	34	0	25	137	0	380
Traineeship employed	0	2	9	3	0	6	0	0	0	2	0	22
Traineeship training	4	8	15	2	34	11	10	2	4	45	0	135
Voluntary literacy tuition	0	0	0	0	0	0	0	0	7	0	0	7
VTOS Core	4	21	53	4	3	18	18	0	66	18	1	206
Youthreach	0	1	3	0	0	0	2	0	303	5	0	314
Total	163	452	853	212	506	748	408	74	2869	754	24	7063

Figure 6. Heatmap of FET courses on fetchcourses.ie. *Learning fields cross-tabulated with programme categories. Darkness of colour is representative of count of courses. Numbers are approximate as the fetchcourses.ie database is regularly updated. Heatmap based on analysis of this report.*

4.3.3 FET courses registered on the IRQ

To gain an insight into the offering of courses equivalent to micro-credential courses, the list of courses registered by the FET on the Irish Register of Qualifications were compiled. The Irish Register of Qualifications (IRQ), managed by the QQI, has an interactive dashboard listing all registered qualifications, and search results can be filtered according to provider, NFQ level or sector (Further Education, Higher Education, or Apprenticeship). The FET have 4052 courses registered on the IRQ. Whilst this register does not have a 'micro-credential' category, courses which are 'micro-credential size' (e.g. between 5-10 ECTs) were listed. Out of these, 1049 are level 6. Out of these 1049, courses which are between 5 and 10 ECTs comprise Minor awards (*n* = 21) and Special Purpose awards (*n* = 45), constituting 66 courses.

It should be noted that one course, 'SPA in Lean six sigma' was noted on the IRQ as 'unclassified' and recoded as 'Business, Administration & Law' here. Furthermore, 17 courses classified as 'Education', upon review of the course titles, were recoded to 'Manual Handling & Work-based learning'. Similarly, 7 courses classified as 'Services' were recoded as 'Food Safety'.

The subject areas of these courses, in order of most common to least (Figure 8B), were 'Engineering, Manufacturing and Construction' (*n* = 30), 'Business, Administration & Law (n =7), 'Manual Handling & Work-based learning' (*n* = 17), 'Food Safety' (*n* = 7), 'Agriculture, Forestry , Fishery & Veterinary' (*n* = 3), 'Transversal' (*n* = 2), and 'Natural Sciences, Mathematics and Statistics' (*n* = 1). Within the largest subject area, 'Engineering, manufacturing and construction', most of the courses regard specific applied skills in engineering or construction, such as 'Domestic heat pump installation' or 'Micro-generator electrical installation'. Moreover, several courses have cross-cutting themes with sustainability e.g. 'Small-scale wind systems installation' and 'Micro solar PhotoVolataic Systems Implementation'.

The majority of these courses (*n* = 37, 56%), are delivered by non-ETB providers, such as Tegasc, METAC, SQT Training limited etc. In a few instances, for example courses relating to manual handling instruction, or delivered by multiple providers, possibly indicating high demand. The remainder of these courses (*n* = 29, 53%), are delivered by some of the ETBs (Figure 7C). The Cavan and Monaghan ETB deliver the majority (*n* = 10). There are also numerous courses delivered by multiple ETBs, e.g. 'Domestic Heat Pump Installation' (City of Dublin ETB, Laois & Offaly ETB, Waterford & Wexford ETB), 'MicroSolar PhotoVoltaic Systems Implementation (Cavan & Monaghan ETB, City of Dublin ETB, Cork ETB), and 'Small scale wind systems implementation' (City of Dublin ETB, Laois & Offaly ETB).

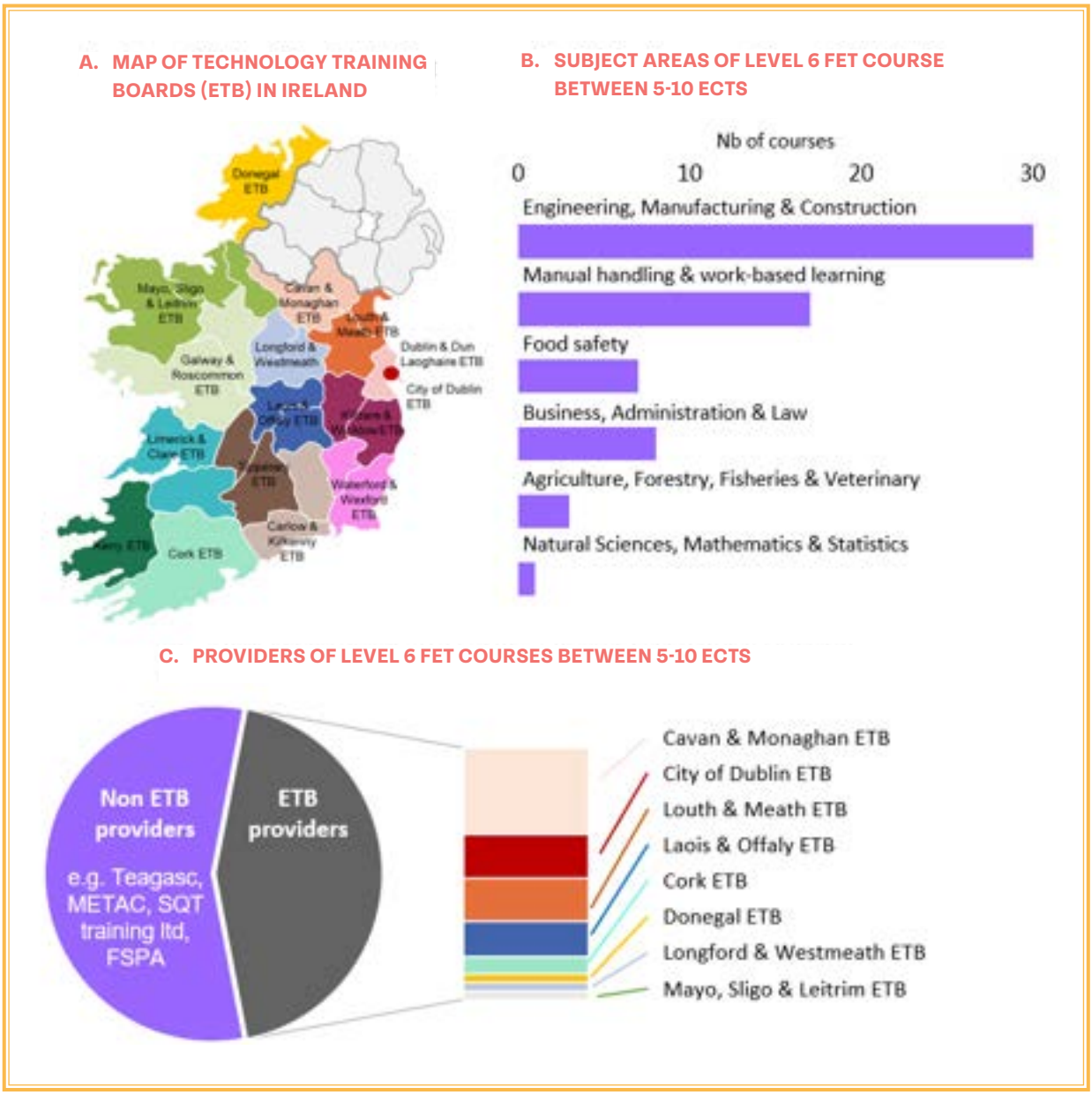


Figure 7. Small accredited courses delivered by FET. *A. Map of Education Training Boards (ETBs) in Ireland. B. Subject areas of level 6 FET courses between 5-10 ECTs. C. Providers of level 6 FET Courses between 5-10 ECTs. Chart based on data analysis for this report.*

4.4 TECHNOLOGICAL UNIVERSITIES AND INSTITUTES OF TECHNOLOGY

Like many higher education institutions across Europe, the recent popularisation of micro-credentials has incentivised institutions to reflect upon their practices associated with short-term learning experiences and develop specific micro-credential policies.

A specific objective of this needs analysis included compiling a snapshot of current work being done related to micro-credentials in the N-TUTORR programme partners. To achieve this, an MS forms survey was disseminated amongst N-TUTORR institutional leads to compile information relating to usage, practice, policies, and future development on each institution (see 9. Appendix for the survey). The findings of this survey are presented here (see Figure 8 for a snapshot summary). Where relevant, survey findings are supplemented with discussion points from a meeting held with N-TUTORR institutional leads.

4.4.1 The TU/IoT sector offer a wide variety of short-term learning experiences

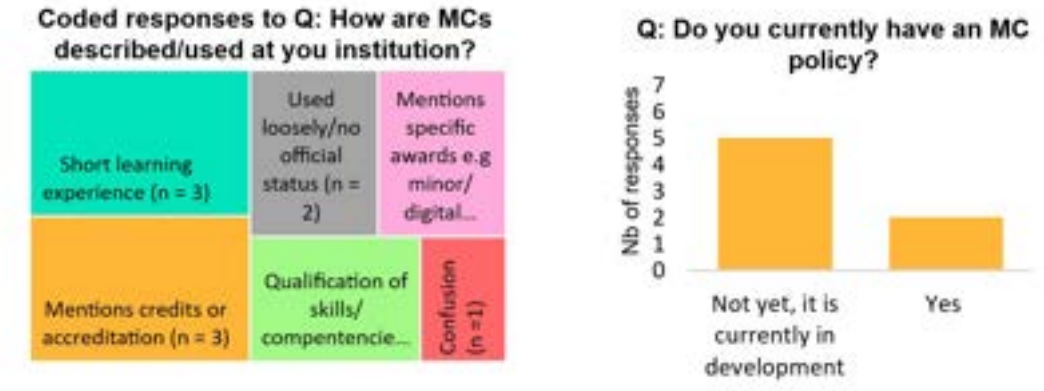
Responses from the MS forms survey indicate that the TU/IoT sector offer a variety of short-term learning experiences, including special purpose awards, minor awards, digital badges, professional certs, supplemental awards and MOOCs (Figure 8A). Institutional leads (hereby referred to as 'respondents') chose at least two of the provided options, with two (ATU and DkIT) selecting five. This reflects the longstanding tradition that the TU/IoT sector have of offering short learning experiences (QQI, 2021). As aptly noted by one respondent:

> ***"It may well be argued that MCs have been in place for 20+ years in the form of minor awards, special purpose awards, supplementary awards, and first of all, single subject certificates"***

Therefore, generating a definite list of micro-credential courses, with micro-credential properties, is difficult to achieve. This is largely due to a lack of existing policies at institutions. Institutions may have hundreds of accredited short term learning experiences that are eligible to be termed micro-credentials. Indeed, according to the Irish Registry of Qualifications, there are 940 qualifications registered by the TU sector that are under 10 ECTs, and include minor/major and special purpose awards. Thus, generating a comprehensive list is beyond the scope of this needs analysis.

A. TU SECTOR OFFER A VARIETY OF SHORT-TERM LEARNING EXPERIENCES

B. MICRO-CREDENTIAL POLICIES ARE CURRENTLY BEING DEVELOPED ACROSS THE SECTOR



C. THE N-TUTORR PROJECT CAN CONTRIBUTE TOWARDS COHESIVE VISION ACT AS A PLACE FOR BEST-PRACTICE EXCHANGE

Figure 8. Snapshot of micro-credential landscape in TU sector. *Informed by responses to an MS forms survey on micro-credential definition, usage and policy development administered to N-TUTORR institutional leads.A. List of short learning experiences offered at TUs. B. Status of MC definition and policies. C. How N-TUTORR programme can support partner institutions regarding micro-credential policy and practice. Based on data analysis for this report. This information was correct as of June 2023.*

4.4.2 Most TU institutions are currently developing their micro-credential policies

Respondents were asked two questions regarding the practical definition of micro-credentials: 'How is the term micro-credentials used at your institution' and 'How is the term used?'. The purpose of including both questions was to account for possible different interpretations and comparisons between definition and practice. The responses from both were merged to give one account of a practical definition for micro-credentials. These responses were coded for common meaning categories (Figure 8B). Most (n = 5) indicated that the term was used at the institution, however it may only be used informally with no official status according to academic council, due to a lack of a current policy being in place (Figure 8B) e.g;

> ***"The term is loosely used at the moment (as of June 2023) and is not used officially. There is no policy at present and the minimum number of credits for an award is 10 ECTS credits."***

Other common categories regarding the description of the term micro-credentials was that it refers to a short learning experience, may or may not be accredited, association with specific awards such as minor awards or digital badges, acting as proof of obtained skills or experience and one response highlighted the confusion associated with unclear practices and interchangeable nomenclature (Figure 8B).

Most respondents (n = 5) indicated that their institution is in the process of developing a specific micro-credentials policy (Figure 8B). A comparison of policy development status, definition, credit range, and existing offerings is outlined in Table 5. At the time of writing this report, only TUS had released their most recent policy publicly, although SETU have a white paper policy in place. The TUS policy seems to be heavily informed by recent recommendations made to the European Commission (European Commission, 2022). It recognises the importance of stackability but does not describe specifics of functionality. Furthermore, they have capped ECTs at 10 per micro-credential (Table 5). Indeed, there is no consensus amongst the N-TUTORR institutions as to what should be the range of micro-credential courses, with responses indicating ranges from 1 to 60 (Table 5).

4.4.3 N-TUTORR can act as a space to guide best practice and cohesive vision

The final question on the MS forms survey asked respondents: 'What could the N-TUTORR programme do that would help your institution in terms of developing policies, or offering micro-credentials at your institution?'. Responses were coded according to common themes (Figure 8C). Respondents indicated that the N-TUTORR programme could play an important role in facilitating best practice exchange regarding micro-credential policy and practice. Several (n = 3) specifically called for the collaborative creation of a working definition and statement of characteristics, which could be shared amongst the TU sector (Figure 8C). This identified need by the institutional partners highlights the current lack of consistency regarding definition, working framework and concept towards micro-credentials in the TU sector. Indeed, it strongly reflects advice given to HE leadership by Brown (2023, p.9), who argues that "effective strategy should have strong interfaces across the institution, such as a micro-credential advisory board or active community of practice". As most partners are currently in different stages of developing their micro-credential policies, evidently the N-TUTORR programme is in place in a crucial part of the timeline, and has a potential role to drive cohesive, evidence-based approach, which is key to effective implementation by higher education.

Table 5. Micro-credential policy and practice at N-TUTORR partner institutions. *Informed by responses provided by institutional leads in MS forms survey and/or provided policy documents. This information was correct as of June 2023. MC = Micro-credentials*

INSTITUTION	POLICY STATUS	DEFINITION	CREDIT RANGE	EXISTING MC OFFERINGS
ATU	In development	No official definition	5-30	MCs associated with Higher Ed 4.0 and DASBE project
DkIT	In development: registrar's office doing 'environment scan' of other HEI policies	No official definition at this time. Used loosely	5-10	Special Purpose Awards and non-accredited certificates
IADT	In development	Term not currently used	5-10	Number of level 8/9 5-10 ECTs being developed
SETU	In development: White paper policy in place	Micro-credentials are qualifications that recognise smaller and more specific achievement of knowledge, skills or experience	1-30	Currently piloting sub 5-ECT modules
MTU	In development: Working group providing a report with recommendations on MC policy to academic council	No encompassing term for micro-credentials given, gives definitions based on three defining categories	1-60	Including larger courses such as SPA and smaller non accredited certificates such as digital badges as counting as a 'micro-credential'
TU Dublin	In development: Early stages of discussion	No official definition	To be confimed	None validated
TUS	Publicly available – subject to change	Uses European commission (2022) definition	Up to 10	Department specific, currently unknown. DASBE project

Irelands' skill demands landscape

5

5 Irelands' skill demands landscape

The modern world of work is a rapidly changing environment, with roles and related skills ever-changing and evolving. This continually evolving system means that today's learners and graduates need to engage in lifelong learning and continually adapt to secure employment. Of course, higher education providers play a key role in this development of student skills to promote lifelong learning, and increase student adaptability and employability (IBEC, 2023). In this report, we use the definition of employability defined by IBEC (2023):

> ***"a set of achievements - skills, knowledge and personal attributes - that enable individuals to fulfil their potential, gain employment, be effective in the workplace and successful in their chosen occupations, which benefits the individual, the employer, the community and the economy"***

However, as noted by Clarke (2018), although the concept of employability usually encompasses personal attributes, skills and knowledge, praxis in the discourse and strategy implemented by higher education usually focuses on skills. It has been estimated that 50% of all employees worldwide will need reskilling by 2025 (World Economic Forum, 2021). Reflecting this, Ireland's skills strategy for 2025 proposes a specific objective that Education and Training providers will "...place a stronger focus on providing skills development opportunities that are relevant to the needs of learners, society and the economy" (Department of Education and Skills, 2016, p.17).

An objective of this needs analysis (OB3) was to generate an overview of industry skill demands in Ireland, taking into consideration region-specific needs. This analysis used four sources of information to generate this overview:

1. The Cedefop OVATE-Skills database
2. Ireland's national skill strategy report 2025 (Department of Education and Skills, 2016)
3. Two reports from SOLAS: National Skills Bulletin (2022) and Ireland's difficult to fill vacancies (2022).
4. Informal consultations with regional skills forum managers

5.1 CEDEFOP OVATE-SKILLS DATABASE

There are various ways to categorise skills and competencies. This report draws on the European Skills, Competencies, Qualifications and Occupations (ESCO) classification. These skills can be categorized as Attitudes and Values, Knowledge and Skills and Competencies. In this classification system, there is no distinguishing between Skills and Competencies so they are often referred to as just 'Skills'. These are also mapped to the International Standard Classification of Occupations (ISCO), which is a four- level classification of occupation groups managed by the International Labour Organisation (ILO).

Pertinent to this report, ESCO also has a three-level classification specifically for skills:

- **Level 1:** Skills are categorized into eight broad categories intended to provide a high-level overview of the different types of skills that exist across various fields e.g. 'Information and Computer Sciences'
- **Level 2:** Skills are grouped together into more specific clusters based on their characteristics and applications to provide a more detailed overview of the different types of skills within a broad category e.g. 'Data analysis'
- **Level 3:** Skills are described in detail, including their specific application, level of proficiency, and context of use e.g. 'Managing and analysing digital data'.

The European Centre for the Development of Vocational Training Cedefop, maintains a database called 'Skills – OVATE' which offers detailed information on the jobs and skills employers include in Online Job

Advertisements (OJAs) in European countries, including Ireland (Cedefop, 2023b). It is updated four times a year, based on financial quarters (Q1-Q4). Their website includes an interactive dashboard which allows users to explore sectors, skills and occupations according to country of interest. In May 2023, an exploration of the most requested knowledge (ESCO level 1) according to OJAs between Q1- Q2 demonstrates that 'Business, administration & law' (75.95%), 'Generic programmes and qualifications' (75.85%), and 'ICTs' (56.39%) are the top 3 knowledge skills in demand (Figure 9A). The knowledge areas in least demand were 'Services' (9.71%), 'Agriculture, forestry, fisheries and veterinary' (1.65%) and 'Education' (1.51%, Figure 9A).

Regarding Skills, eight ESCO level 1 areas were identified (Figure 9B). The skills highest in demand were 'Communication, collaboration and creativity', (94.95%), closely followed by 'Management skills' (87.07%). In least demand were 'Handling and moving' (12.26%), 'Working with machinery and specialised equipment' (12%), and 'Constructing' (1.74%, Figure 9B).

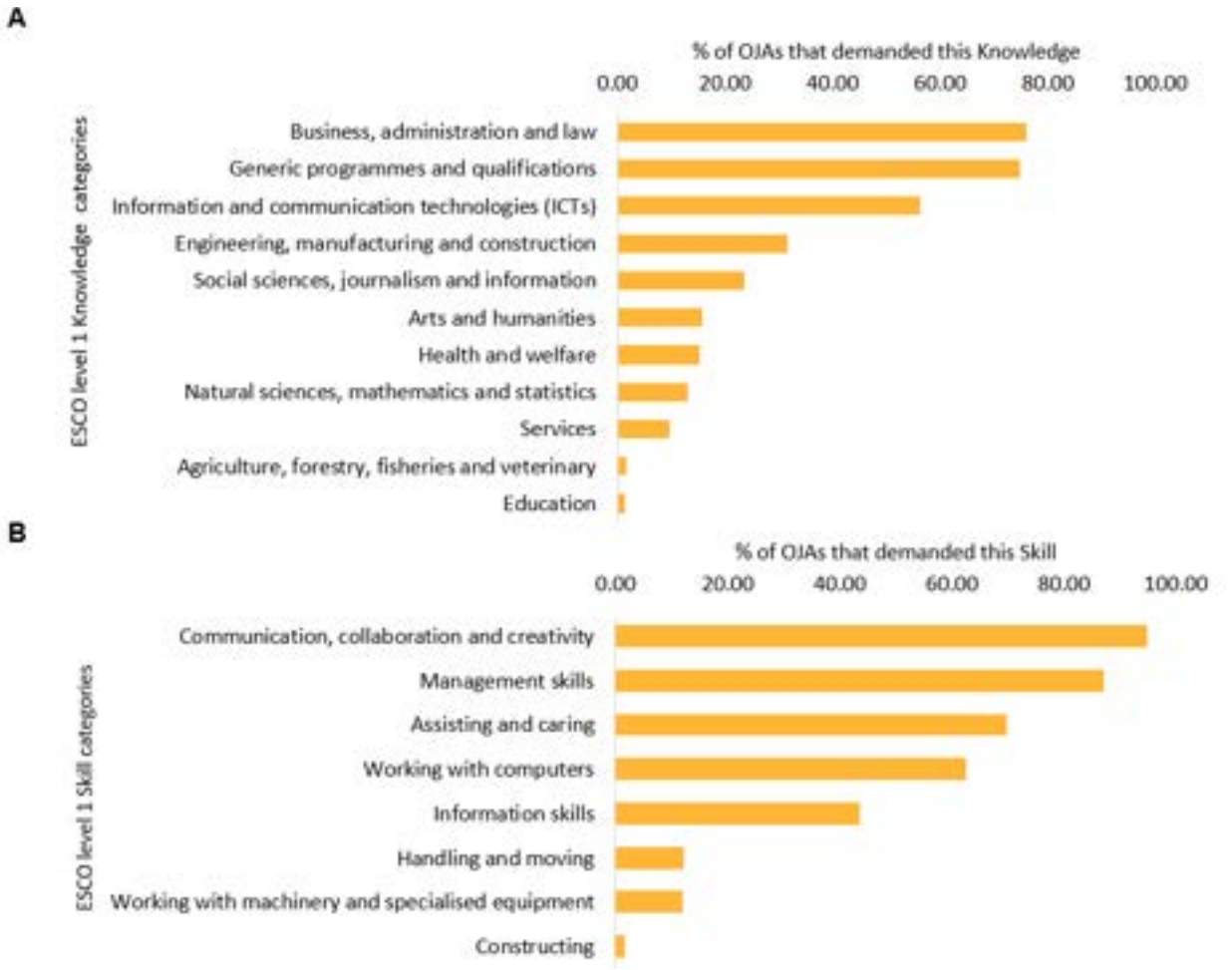


Figure 9. Percentage of ESCO level 2 demands in OJAs in Ireland 2022. *A. Percentage of ESCO level 2 knowledge demands in OJAs. B. Percentage of ESCO level 2 skill demand in OJAs. Chart based on data analysis for this report.*

The level 3 classification of ESCO examines terms more specifically. There were 78 unique knowledge terms and 202 unique skill terms identified in OJAs (Table 6). However, some terms were specified in many OJAs, whilst others were specified in very few. For example, there were 202 unique Skill terms, appearing in between 0.00016 - 79.83% of OJAs (Table 6). From the higher end of the range: 'Using digital tools for collaboration and productivity' appeared in 54% of OJAs; whereas from the lower end: 'disposing of non-hazardous waste or debris', appeared in only 0.03% of OJAs. Moreover, most of these terms featured in 15.49% or less of OJAs (see Table 6 for median % and 90th percentiles). As such, only the 90th percentile of terms specified by OJAs are presented in Figure 10.

Table 6. Number of ESCO level 3 terms in knowledge and skills in Ireland 2022 OJAs. Data taken from Cedefop Skills – OVATE (Cedefop, 2023b).

ESCO level 3 category	Number of unique terms identified in OJAs	% range of frequency of related terms in OJAs	Median %	90th percentile
Knowledge area	78	<1.00 - 74.85	1.57	18.22
Skills	202	<1.00 - 79.83	0.39	15.49

The top three level 3 Knowledge demands were 'Personal skills' (75.85%), 'Management and administration' (47.42%) and 'Computer use' (42.70%, Figure 10A). The top three level 3 ESCO skills identified were 'Working in teams' (79.83%), 'Planning and scheduling events and activities' (59.33%), and 'Using digital tools for collaboration and productivity' (54%, Figure 10B). In fact, many of the ESCO level 3 knowledge and skill terms highest in demand in OJAs in Ireland relate to what is referred to as 'Transversal skills' or 'Transversal competencies'.

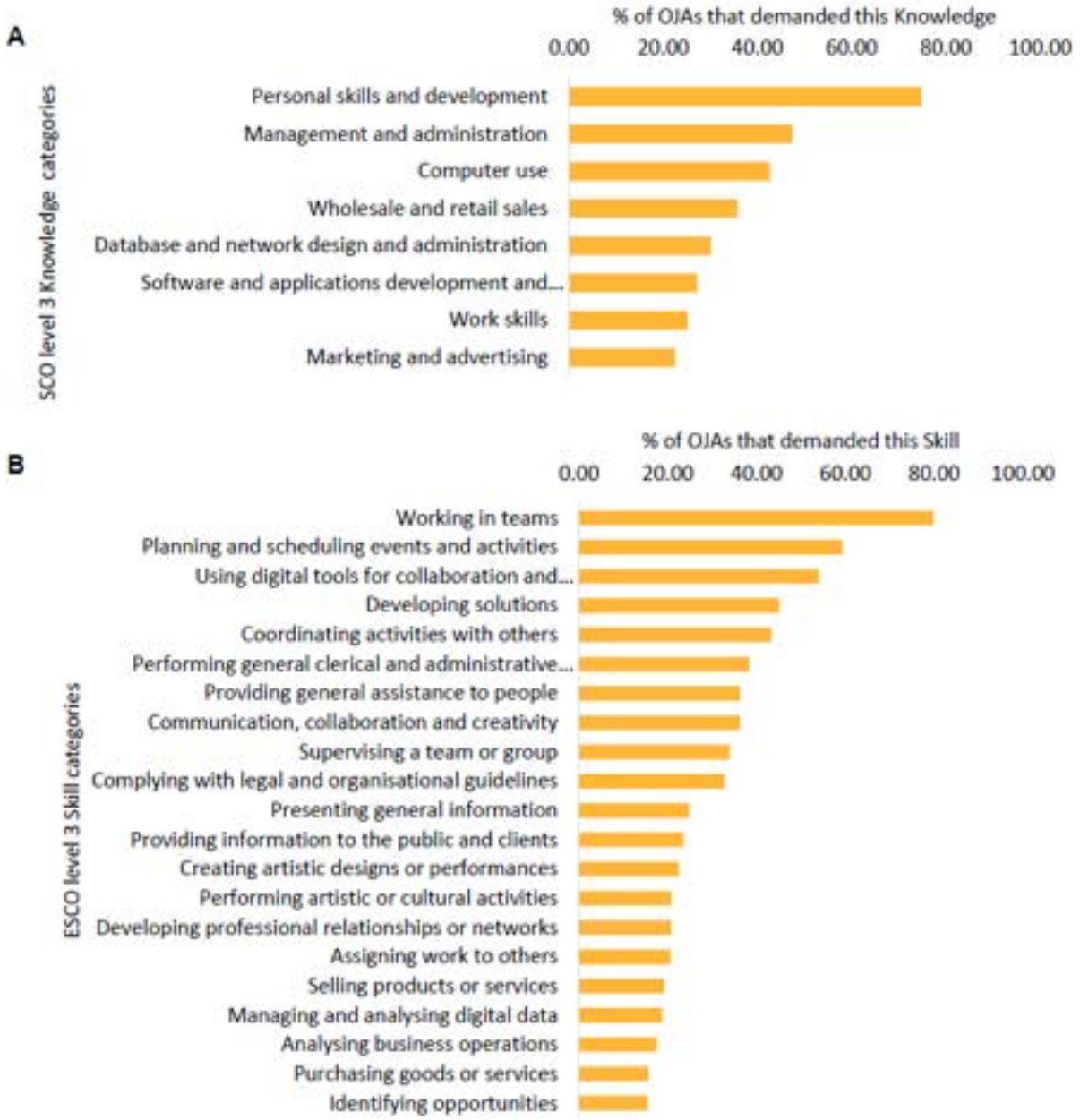


Figure 10. ESCO level 3 knowledge and skills demands in Ireland OJAs in 2022. *The 90th percentile of terms specified by OJAs. Data taken from Cedefop Skills – OVATE (Cedefop, 2023b). A. ESCO level 3 knowledge demands. B, ESCO level 3 skill demands. Chart based on data analysis for this report.*

Transversal competencies can be summarised as "...knowing how to deal with new situations, being creative, working in groups, demonstrating critical thinking, being sociable, accepting responsibility, and demonstrating leadership", and are highly sought for by employers (García-álvarez et al., 2022, p.4). Their importance is reflected in the way that in recent years recruitment and selection strategies for new employees has shifted its focus from qualifications and technical skills, to evaluating candidate's capabilities (Santos Rego, Lorenzo & Vázquez-Rodríguez, 2018, as cited in García-álvarez et al., 2022). In a systematic review of the transversal competencies for employability in university graduates from an employer's perspective, García-álvarez (2022)

identified the top ten most important transversal competencies for employers as the following: Basic skills (literacy, numeracy, oral and written communication), Teamwork skills, Problem-solving skills, Interpersonal skills, Basic and job-specific ICT and computer skills, Life-long learning s kills, Basic knowledge and skill fields of the profession, Flexibility and adaptability skills, Analytical skills, and Ethical working. Many of these are reflected in the top ESCO level 3 skill demands in OJAs reported here (Figure 10B). This further highlights the importance of Transversal skills to employers in Ireland.

5.2 IRELAND'S NATIONAL SKILLS STRATEGY 2025

Ireland's national skills strategy 2025 report outlines the visions, actions and targets set out to support the development of a "well-education, well-skilled and adaptable labour force" in Ireland, between 2016 and 2025 (Department of Education and Skills, 2016). It builds on the previous strategy, 'Towards Tomorrow's Skills', which was published in 2007. The report identified five global trends that directly influence the country's skill needs (Department of Education and Skills, 2016): technological change (e.g. integration of technological advancements in the in the design, manufacturing and supply of foods and services), changing consumption patterns (e.g. the demand of e-commerce), new ways of working (e.g. employees needing to upskill to adapt to changes), global value networks (e.g. project management), urbanisation and pressure on resources (e.g. development of ICT and engineering), and shifting power structures (e.g. management and business planning).

The report also emphasises that "Over the next ten years, people working in Ireland will need a mix of sectoral, cross-sectoral and transversal skills" (Department of Education and Skills, 2016, p.33). Cross-sectoral skills can be described as skills which can be applicable across various sectors (Table 7).

The report also identifies sector specific needs (Table 8). The skills required in these sectors will be required at both high-level qualifications (ISCED 97 levels 5 and 6) and also medium-level qualifications (ISCED 97 levels 3 and 4) (Department of Education and Skills, 2016, p.33).

***Table 7. Cross-sectoral skills in demand in Ireland**. As identified by the Expert Group on Future Skills Needs (Taken from Department of Education and Skills, 2016)*

SECTORAL SKILLS	EXAMPLES
ICT Skills	Software developers, cloud, security, networking and infrastructure and a combination of these technical skills with business/analytic/foreign language skills as the skills requirements become more complex.
Data analytics	Deep analytical talent, Big Data-savvy roles, Supporting technology
Foreign language and cultural awareness	German, French, Spanish, Italian, Portuguese and the Nordic languages.
Business skills -sales and marketing	Dealing with customers, technical sales and product development.
Engineering	Mechanical, Electrical / Electronic, Industrial / Manufacturing – production, process quality, validation, product design/development.

Table 8. Sector specific needs. *As identified by the Expert Group on Future Skills Needs (Taken from Department of Education and Skills, 2016)*

SECTOR	SPECIFIC NEEDS
Financial Services	Risk, compliance, accounting, business intelligence, ICT and data analytics. These skills can be found in engineering, mathematics, data analytics, business and law graduates.
ICT sector	Core technology skills, e.g. software developers, cloud, security, networking and infrastructure and a combination of the technical skills with business/analytic/ foreign language skills as the skills requirements become more complex
Manufacturing	Scientists with experience and engineers
Medical Devices	Mechanical, automation and validation engineers; polymer technicians, software engineers, quality engineers and regulatory compliance experts
Bio-Pharma	Technicians and senior process scientists, pharma co-vigilance personnel, biotechnologists, biochemists, engineers including precision engineering
Food & Beverages	R&D scientists, food technologists and technicians with new product development skills; international sales/marketing with languages for international trade
Leisure, Tourism & Hospitality	Chefs; commis, demi, pastry and chef de partie
Freight, Transport & Logistics	Gradate-managers, planners and ICT staff; skilled warehouse staff and HGV drivers
Wholesale & Retail	Accountancy, supply chain management, retail marketing and data mining of retail data, finance and human resource management
Construction	Chartered surveyors; internationalisation and management capability; ICT, Building Information Modelling (BIM) systems and Green Economy skills

5.3 SOLAS SKILLS BULLETIN AND IDENTIFIED SKILLS SHORTAGES

Although the Ireland's skill strategy 2025 report identified key sectors with skill demands, it was informed by data available at the time of its publishing, in 2016. Skill needs and sectors can rapidly evolve, and much change was accelerated by the impact of the COVID-19 pandemic. Therefore, it is important to consider more recent national reports on skills shortages. The Skills and Labour Market Research Unit (SLMRU) in SOLAS provide valuable insights into the most recent trends.

The latest skills bulletin (2022) published by SOLAS indicated 22 areas for skills shortages, across 16 sectors (Table 9). SOLAS define a skills 'shortage' as "...situation whereby the supply of skills or labour from within the Irish workforce is insufficient to meet demand". Identified sectors with skill shortages in Science and Engineering, IT, Business and Finance, Healthcare and Construction (Table 9), which reflect the ESCO level 2 knowledge categories in demand by OJAs (see section 5.1) and also track from what was identified in national skills strategy (section 5.2). The SOLAS skills bulletin also specifies the roles that are in demand in these sectors (Table 9). Project managers appear in both IT and Construction sectors, whilst Leadership also appears in Business and Finance (Table 9). This suggests a cross-sector demand for management skills, which was also reflected in the ESCO level 2 knowledge demands (see section Table 9).

Table 9. Skills shortages in Ireland 2022. *Identified in the most recent skills bulletin by SOLAS. *=identified as a labour shortage rather than a skills shortage. = identified as 'possible' skills shortage. ¥ = identified as skills in demand*

SECTOR	SKILLS SHORTAGE IDENTIFIED
Science & Engineering	• Analytical scientists • Process scientists • Medical scientists
IT	• IT project managers • Software developers/engineers • IT analysts/engineers • IT Technicians with foreign languages
Business & Finance	• Data analytics • Digital transformation • Risk and compliance • Leadership • GDPR/Cybersecurity
Healthcare	• Medical practitioners • Nurses
Education	No specific shortages identified
Social & Care	• Healthcare assistants • Care workers*
Legal & security	No specific shortages identified
Construction	• Quantity surveyors • Civil engineers¥ • Construction project managers¥ • Plumbers¥ • Carpenters¥
Other Craft	• CNC programmers • Welders¥ • Electricians¥
Agriculture & animal care	No specific shortages identified
Hospitality	• Chefs
Arts, Sports & Tourism	No specific shortages identified
Transports & logistics	• HGV drivers • Taxi drivers
Administration & secretarial	No specific shortages identified
Sales, marketing & customer service	• Consultative sales • Technical sales • Digital marketing
Operatives & Elementary	• Operatives in various manufacturing subsectors (food, machinery, high-tech) • Technical skills e.g. goods manufacturing • Transversal skills (teamwork, problem solving, health & safety)

5.4 REGIONAL ENTERPRISE STRATEGIES

To determine region-specific skill demands, each regional enterprise strategy documents was reviewed to identify industries/sectors that had been highlighted as being in growth, experiencing skill shortages or emerging. From this, an initial map was generated. To complement this initial map, regional skills managers were contacted to ask for recent skill audits and/or emerging trends on industry skill needs. The regional skills managers were assigned to each NUTS III region in 2022, as part of the action plan presented in the 2025 national skills strategy, and support that region in audit and development of skill needs. Out of the nine regional skill managers, seven replied, providing either specific documents or informal advice, which informed revisions made to the map, resulting in a second version (Figure 11).

The influence of global megatrends highlighted by the OECD (2023) report is evident in the regional enterprise documents, as three sectors were highlighted in all region skill strategy documents: sustainability-related industries (including low-carbon, renewable energy and bio-economies), circular economy (including investing in enterprise, innovation and SMEs) and digitalisation & digital skills (Figure 11). The skills strategy review group noted both 'digital transformation' and industries addressing issues relating to climate change as being critical global trends that are shaping Ireland's economic landscape (OECD, 2023). Furthermore, it is important to note that as Dublin is the largest economic region in Ireland (with over 84,000 businesses), the region reflects national trends and skill demands.

Closely linked with digitalisation is automation of processes in manufacturing (e.g. Midlands), and adaptation of smart technologies both generally (e.g. West and Dublin) and across specific sectors such as Ag-tech and Fintech (e.g. North-West, West, Mid-West). In fact, in their skill strategy document, Dublin has proposed to act as global test-bed for emerging technologies and to 'use the city as a place to test and trial new innovations' (Government of Ireland, 2022).

Some regions have particular strengths and therefore higher skill demands in these sectors, such as the Medtech and Life Sciences sector in the West, Engineering in the North-East, and Animation in the South-East (Figure 11). The strength and importance of Ireland's agricultural sector is evident across all regions (Figure 11).
In addition to these highlighted sectors, strategy documents and advice from regional skills managers also emphasise the importance of transversal skills across all sectors, including project management (Figure 11).

This aligns with the highest level 3 ESCO skill terms specified by Ireland's OJAs, which indicated key transversal skills are in demand such as working in teams, planning and scheduling events and activities, developing solutions etc (Figure 10B). Moreover, this reflects what was reported by Crowley & Jeske (2021) who interviewed recruiters at a careers fair in UCC, Cork, to identify common requirements for new graduates. Their thematic analysis of responses from interviewed recruiters identified five skill areas: Technical skills, Organisation Skills, Communication/Presentation skills, Interpersonal skills, and Analytical skills. That four out of five of these skill themes could be consider as transversal skills, emphasises the importance that employers give these competences in new employees.

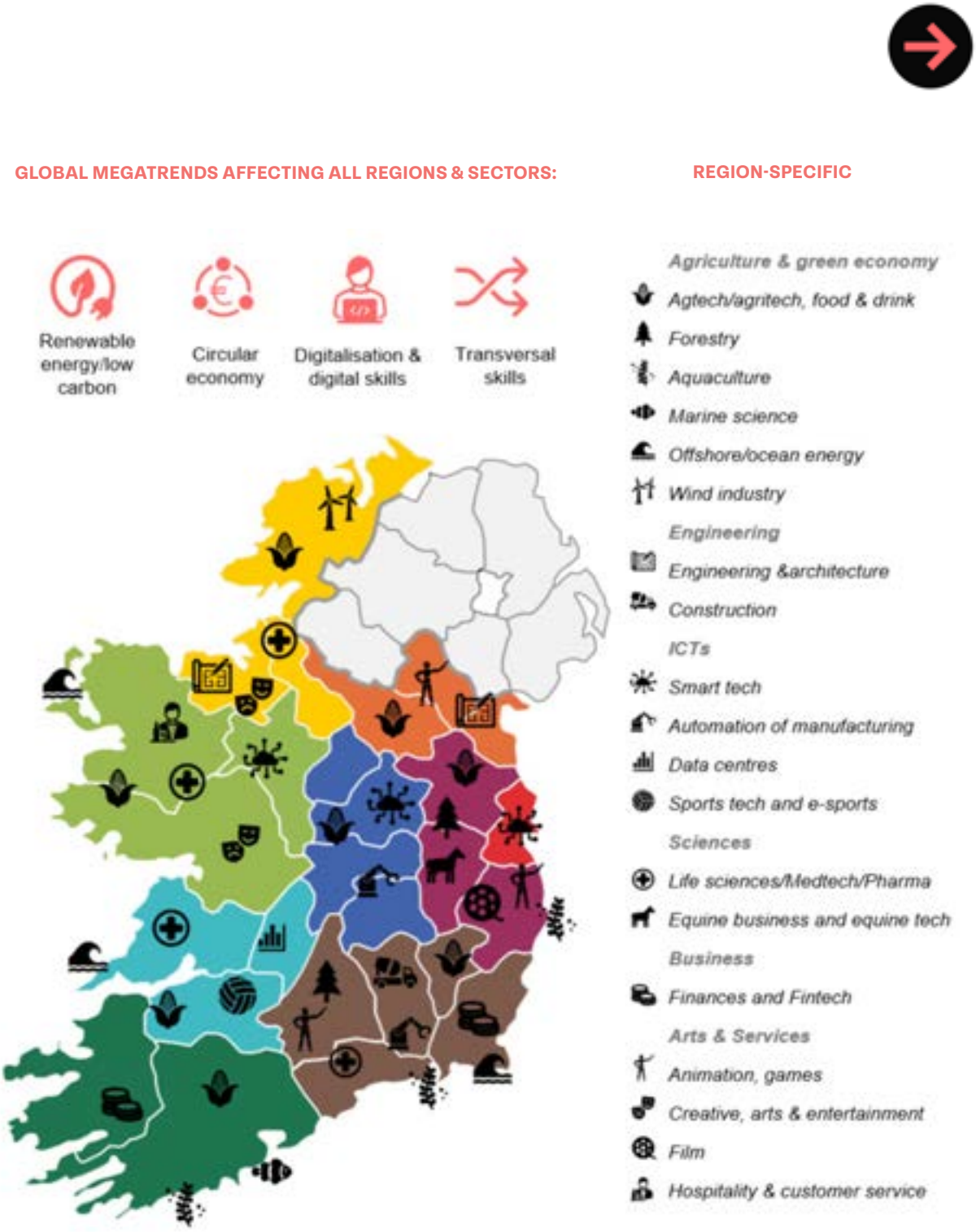


Figure 11. Regional skills map. *Informed by Ireland's national skills strategy, regional enterprise strategies and informal consultations with regional skill managers. Based on data analysis for this report.*

Identifying micro-credential provision gaps

6

6 Identifying micro-credential provision gaps

The overarching research question underpinning this needs analysis was 'What is the current landscape of micro-credentials offered by the higher education sector in Ireland, and in what way can the TU sector contribute to address industry needs, including regional-specific needs?'. Towards this goal, specific objectives of this analysis sought to generate an overview of (i) the current micro-credential offerings across the third level sector in Ireland and (ii) Ireland's skill needs, including regional-specific skills needs, to identify potential gaps in current provisions to inform the curation of a suite of micro-credentials delivered by the TU sector under the N-TUTORR programme.

From this needs analysis, it is evident that Ireland's national skill needs are directly driven by global megatrends such as climate change, digital transformation, the circular economy, and transversal skills (Figure 12). Supplementing these trends are a variety of specific skill needs associated with the nine NUTS III regions, influenced by local socioeconomic, geographic and industrial factors (Figure 12). Combined, these affect the rapidly evolving skill needs of various established, growing, and emerging sectors, with particularly widespread skill demands in ICT, Business and Finance, and Science and Engineering (Figure 12). Running through all these sectors are a range of transversal skills such as project management and basic IT skills (Figure 12). The current offering of micro-credential provisions, delivered by the IUA universities' MicroCreds project, and a plethora of short-term learning experiences delivered by the FET and TU sector, addresses many of these identified skills needs (Figure 12). For example, the FET sector dominate the provision of certifications between NFQ levels 1-6 in all sectors, with a focus on foundational and vocational skills. The IUA MicroCreds project provide 240 modules across levels 7-9 facilitating general learning and skills acquisition across 13 topics. However, there are some potential gaps in these current provisions, particularly in applied skills at higher NFQ levels 6-9, e.g. Applied Construction Skills, Computer Aided Design and Film Production and Transversal skills (Figure 12). These are areas that well align with the strengths of the TU sector, and a carefully curated suite of micro-credentials developed under the N-TUTORR programme could address the skills gap in the market.

The next section of this report will summarise the conclusions from this needs analysis and provide a series of recommendations to inform the development of micro-credentials in the technological university sector.

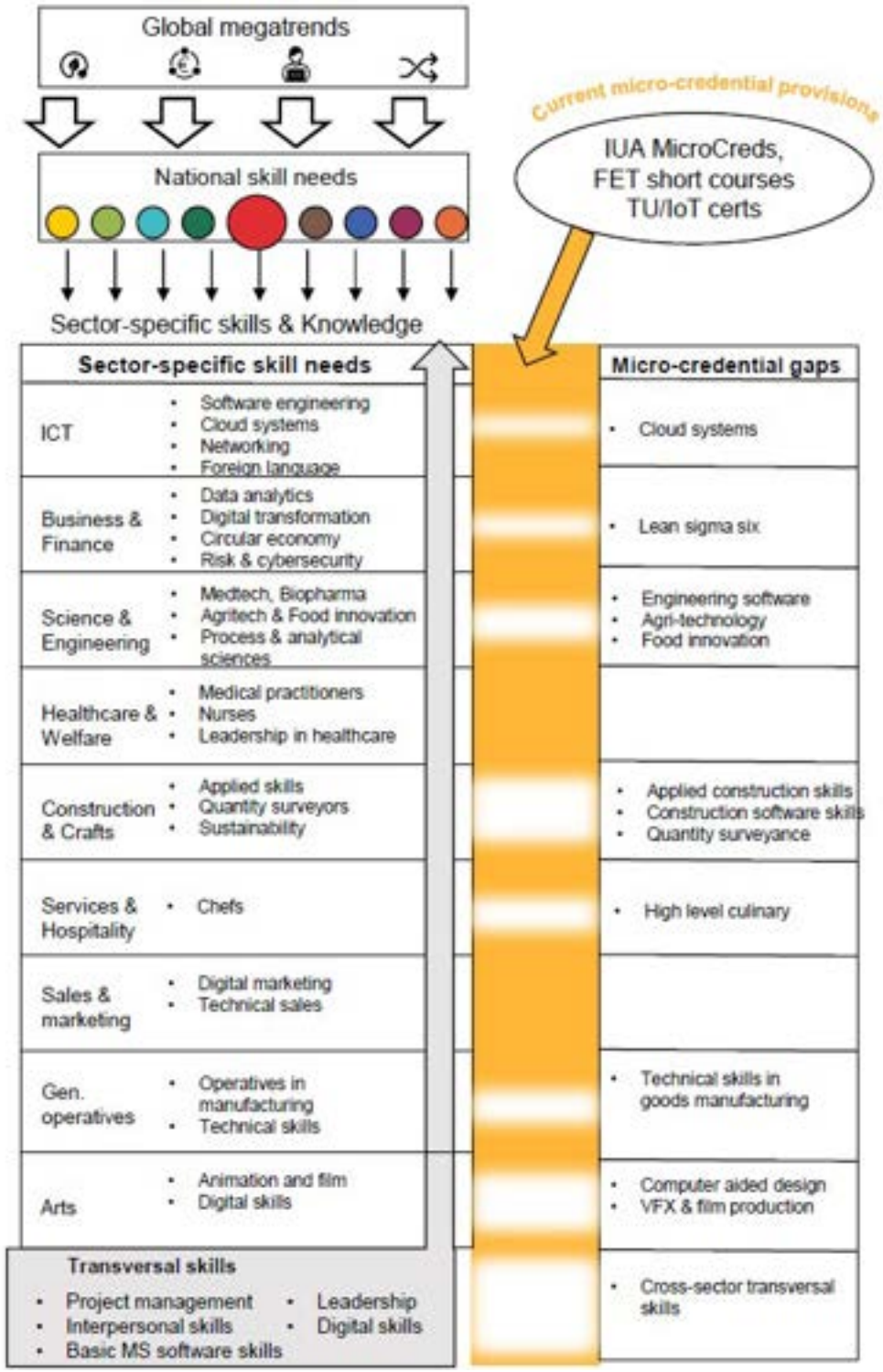


Figure 12. Summary of micro-credential provision gaps in addressing industry needs. *Each sphere in National Skill Needs represent one Ireland NUTS III region. The red sphere, representing Dublin, is larger due to its large economy and strong influence on national strategies. Intensity of white gaps in current micro-credential provision strip represents extent of provision gap. Based on analysis for this report.*

Conclusions & Recommendations

7

7 Conclusions & Recommendations

This information needs analysis aimed to review the current landscape of micro-credentials offered by higher education institutions and the further education and training sector in Ireland and identify regional skill demands, to inform evidence-based recommendations for policy and practice amongst the N-TUTORR partners in the TU sector. Specifically, this needs analysis sought to conduct a mini literature review on micro-credentials in higher education, provide an overview of micro-credentials offered by higher education in Ireland, and generate a list of current industry skill needs, including region-specific needs.

First, the literature summary on micro-credentials in higher education indicates that worldwide there is lack of consensus on the definition and working concept for micro-credentials (Section 3). Common to most definitions is that micro-credentials are proof of skills or knowledge obtained by learners after completing a short learning experience at an awarding body. The European Commission recently proposed a working definition for micro-credentials, which at the time that this report was written, has already been formally adopted by higher education institutions in Ireland, namely the seven IUA MicroCred partner universities, and Technological University of the Shannon. There are demonstrated benefits of implementing micro-credentials at higher education for learners, institutions and employers. For learners, there is increased flexibility, accessibility, capacity to demonstrate skills to employers. For institutions, micro-credentials represent a possible solution to addressing to rapidly changing skill needs, and provide ways to implement new pedagogies, increase enrolment and reduce costs. For employers, micro-credentials facilitate a tangible way to check prospective employee's skills, and allow for the agile upskilling of current employees. Challenges associated with implementation arise from the absence of a set of guiding principles, an agreed sectoral definition, and the scarcity of available policies to drive engagement.

Second, this needs analysis indicates that there are a wide variety of micro-credentials, or courses with micro-credential properties, delivered by the higher and further education sector in Ireland (Section 4). The Further Education and Training (FET) sector have an established legacy of providing short training experiences from NFQ levels 1-6. Currently, they have over 7,000 courses in a range of subjects, including transversal skills, engineering, construction and ICTs. However, only about 1/7th of these courses are accredited and registered on the Irish Registry of Qualifications. The MicroCreds project delivered by the IUA universities, currently offers 240 short level 7-9 micro-credential courses across a range of academic subjects. Similar to the FET provision, most courses are related to Business, Engineering and ICTs. The TU and IoT sector share common ground with the FET sector, with a longstanding tradition of offering short-term learning experiences, ranging from digital badges (non-accredited) to Special Purpose Awards (from 5-30 ECTs). Currently, none have accredited courses that are officially marketed as 'micro-credentials'. However, it is difficult to obtain a comprehensive scope of their potential micro-credential offering, due to a current lack of a shared definition and working framework. The TU/IoT sector are in a process of reflecting upon their current practices and developing specific policies regarding micro-credential practice and implementation. Yet, even at this stage of policy development, there is already variety amongst partner institutions in definition and credit range. The MS forms survey and working discussion held with N-TUTORR leads highlighted the urgent need for a collaborative and cohesive approach to developing a statement of characteristics for micro-credentials that can be implemented sector-wide. Indeed, achieving this may help to alleviate many of the challenges that have been identified with the implementation of micro-credentials at higher education.

Third, the review of industry skill needs in Ireland indicates that three global megatrends are highly influential: responding to climate change, digital transformation and circular economy (Section 5). This is reflected at European, national, and regional levels. Examination of national and regional strategies indicate that across Ireland there is growth and skill demands in a range of sectors, predominantly business and finance, engineering, medtech and life sciences and agri-tech. The specific geographical and socio-economic profiles for each NUTS III region in Ireland illustrate where some regions have more specific skill demands, such as animation in the South-East, and Engineering and Construction in the North-East. Moreover, transversal skills, such as project management and foundational digital skills, continue to be in demand by employers across sectors. Whilst it is true that these global megatrends will persist in the coming years, more nuanced skill demands are more rapidly changing, especially driving agile needs of SMEs. Therefore, to best address industry skill demand and needs, micro-credential provisions which aim to bridge the gap between higher education and industry, should be reviewed by necessary stakeholders.

Finally, this needs analysis integrated the main findings associated with each objective to identify potential skill needs gaps that are not being catering to by the current micro-credential landscape (Section 6). This integration identified several possible areas within different sectors that may be potential skill needs to target, such as Transversal skills, Applied Construction Skills and Computer-Aided Design.

These findings, informed by both desk research and primary data collection, indicate the following recommendations for the N-TUTORR programme team:

- Collaborate to develop a working definition and framework for micro-credentials practice, to be implemented across the TU sector. This framework should build on the unique strengths of the TU sector and existing legacy of offering flexible, short-term learning experiences. Consider publishing this working definition and framework as a green paper.
- Consider issuing a statement that clearly defines differences between the IUA MicroCreds project and the TU sector micro-credentials framework, to lessen any confusion amongst stakeholders and end users.
- Institutional leads should collate a list of micro-credentials, or existing short-term learning certificates that may qualify under the agreed definition, to be considered for incorporation in the suite of N-TUTORR micro-credentials.
- To ensure that the suite of micro-credentials is achievable within the remaining timeframe of the N-TUTORR programme, institutional leads should identify potential micro-credentials from existing offerings. Furthermore, care should be taken to avoid simple disaggregation of learning opportunities from programmes leading to major awards. In alignment with the characterisation of micro-credentials proposed by the European Commission, micro-credentials should have standalone value.
- Consider noting any potential gaps that could be addressed by de novo micro-credentials for future development.
- In the selection of a suite of micro-credentials linked to N-TUTORR, consider choosing micro-credentials that address specific industry skill needs, rather than general subject content (e.g. ‘Using AutoRevit in Engineering’ instead of ‘Digital Skills in Engineering’ or ‘Heat pump installation’ instead of ‘Sustainable engineering in heating systems’).
- In the selection of a suite of micro-credentials for N-TUTORR, consider choosing at least one micro-credential course that delivers content related to transversal skills, that is applicable across sectors.

- Consider offering more on-campus or blended learning formats to enable practical skills acquisition and to position the TU micro-credential suite in an identified delivery practice gap.
- The intended end user of the suite of N-TUTORR micro-credentials should be described early on in the selection process, to ensure that selection and subsequent marketing of the suite are in accordance with the user profiles.
- The proposed suite of micro-credentials should undergo review to ensure that they objectively align with the working definition and framework, and components have not been submitted to 'window-dressing' i.e. simply terming existing course as 'micro-credentials'. Transparency and dissemination of this process to learners and employers may increase trust and credibility.
- Consider forming a review panel consisting of industry stakeholders to review the proposed suite of micro-credentials.
- Consider the language in the marketing of micro-credentials e.g. titles should reflect content and description should use nomenclature familiar to targeted end users.
- Consider implementing a marketing strategy to raise awareness of the available micro-credentials amongst employers and identified potential users.
- Once the suite of micro-credentials are offered to users, consider a mixture of formative and summative evaluation strategy to determine (i) how the micro-credentials are being used and (ii) strengths and weaknesses to signpost for future revision and improvement.

Ultimately, this information needs analysis sought to employ an evidence-based approach to review the landscape of micro-credentials in the higher education sector, taking into account regional industry skill needs, to inform the curation of a suite of seven micro-credentials to be delivered as part of the N-TUTORR programme. This report generates a high-level overview of both the micro-credential provision and practice by Higher Education and FET in Ireland, combined with a general snapshot of both national and regional-specific skill needs. In addition, a variety of data analysis outputs emerged from this analysis that may serve as valuable resources for stakeholders and policymakers, in particular Figures 2, 8, 11 and 12. This report will serve as a valuable guide to inform the future development and implementation of micro-credentials by the Technological University and Institutes of Technology in Ireland.

References

8

8 References

Accenture. (2020). *Bridging the Gap: Ireland's Digital Divide. https://www.accenture.com/_acnmedia/PDF-128/Accenture-RO-Bridging-The-Gap.pdf*

Ahmat, N. H. C., Bashir, M. A. A., Razali, A. R., & Kasolang, S. (2021). Micro-Credentials in Higher Education Institutions: Challenges and Opportunities. Asian Journal of University Education, 17(3), 281–290. https://doi.org/10.24191/ajue.v17i3.14505

Brown, M., Mac Lochlainn, C., Nic Giolla Mhichíl, M., & Beirne, E. (2020). *Micro-credentials at Dublin City University.* https://youtu.be/KPMSKIbfQXo

Brown, M., McGreal, R., & Peters, M. (2023). A Strategic Institutional Response to Micro-Credentials: Key Questions for Educational Leaders. Journal of Interactive Media in Education, 2023(1). https://doi.org/10.5334/jime.801

Brown, M., Nic, M., Mhichil, G., Beirne, E., & Lochlainn, C. Mac. (2021). *The Global Micro-credential Landscape: Charting a New Credential Ecology for Lifelong Learning.* 8(2), 228–254.

Cedefop. (n.d.). Skills - *OVATE : Introduction.* Retrieved May 5, 2023, from https://www.cedefop.europa.eu/en/tools/skills-online-vacancies

Cedefop. (2022). *Microcredentials for labour market education and training.* https://doi.org/10.2801/351271

Cirlan, E., & Loukkola, T. (2020). *European project MICROBOL: Micro-credentials linked to the Bologna Key Commitments.*

Clarke, M. (2018). Rethinking graduate employability: the role of capital, individual attributes and context. Studies in Higher Education, 43(11), 1923–1937. https://doi.org/10.1080/03075079.2017.1294152

Crowley, L., & Jeske, D. (2021). Recruiter perceptions and expectations of desirable graduate attributes and fit. British Journal of Guidance and Counselling, 49(1), 78–89. https://doi.org/10.1080/03069885.2020.1742287

Department of Education and Skills. (2016). *Ireland's National Skills Strategy 2025.*

Dorner, D. G., Gorman, G. E., & Calvert, P. J. (2017). *Information needs analysis: principles and practice in information organizations.* Facet Publishing . https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,sso&db=nlebk&AN=1560614&site=eds-live&scope=site

EDUCAUSE. (2019). *7 Things You Should Know About Digital Badges.*

ETBI. (n.d.). *Further Education and Training* . Retrieved May 25, 2023, from https://www.etbi.ie/about-etbi/further-education-and-training/

European Commission. (2021). *Proposal for a council recommendation on a European approach to micro-credentials for lifelong learning and employability.* https://ec.europa.eu/info/sites/default/files/social-summit-european-pillar-social-rights-booklet_en.pdf

European Commission. (2022). *Proposal for a Council Recommendation on a European approach to micro-credentials for lifelong learning and employability - Adoption.* https://data.consilium.europa.eu/doc/document/ST-9237-2022-INIT/en/pdf

European Commission. (20201). *A European Approach to Micro-credentials: Output of the Micro-credentials Higher Education Consultation Group - Executive Summary.* https://doi.org/10.2766/67

García-álvarez, J., Vázquez-Rodríguez, A., Quiroga-Carrillo, A., & Caamaño, D. P. (2022). Transversal Competencies for Employability in University Graduates: A Systematic Review from the Employers' Perspective. In Education Sciences (Vol. 12, Issue 3). MDPI. https://doi.org/10.3390/educsci12030204

Gauthier, T. (2020). The value of microcredentials: The employer's perspective. The Journal of Competency-Based Education, 5(2). https://doi.org/10.1002/cbe2.1209

Government of Ireland. (2020). *Future FET: Transforming Learning: The National Further Education and Training (FET) Strategy 2020-2024.* https://www.solas.ie/f/70398/x/64d0718c9e/solas_fet_strategy_web.pdf

Government of Ireland. (2022). *Dublin Regional Enterprise Plan to 2024.* https://enterprise.gov.ie/en/publications/dublin-regional-enterprise-plan-to-2024.html

Ha Thi Ngoc, N., Spittle, M., Watt, A., & Van Dyke, N. (2022). A systematic literature review of micro-credentials in higher education: a non-zero-sum game. Higher Education Research and Development. https://doi.org/10.1080/07294360.2022.2146061

Higher Education Authority. (2022). *National Access Plan: A Strategic Action Plan for Equity of Access, Participation and Success in Higher Education 2022-2028.*

IBEC. (n.d.). *Future ready improving graduate employability skills.* Retrieved May 31, 2023, from https://www.bing.com/search?q=graduate+transversal+skills+AND+ireland&qs=n&form=QBRE&sp=-1&ghc=1&lq=0&pq=graduate+transversal+skills+and+ireland&sc=10-39&sk=&cvid=848-485C28EE14DBE89F4699F7AFA3539&ghsh=0&ghacc=0&ghpl=

Irish Universities Association. (n.d.). *MicoCreds: About Us.* Retrieved May 9, 2023, from https://microcreds.ie/about

Kazin, C. J., & Clerkin, K. M. (2018). *The Potential and Limitations of Microcredentials.* http://supportsystem.livehelpnow.net/resources/23351/Potential%20and%20Limitations%20of%20Microcredentials%20FINAL_SEPT%202018.pdf

Mcgreal, R., Mackintosh, W., Cox, G., & Olcott, D. (2023). Bridging the Gap: Micro-credentials for Development UNESCO Chairs Policy Brief Form-Under the III World Higher Education Conference (WHEC 2021) Type: Collective X. In International Review of Research in Open and Distributed Learning (Vol. 23, Issue 3).

National Forum for the Enhancement of Teaching and Learning in Higher Education. (2021). *NEXT STEPS for Teaching and Learning: Moving Forward Together.* www.teachingandlearning.ie

Nic Giolla Mhichíl, M., Brown, M., Beirne, E., & Mac Lochlainn, C. (2020). *A Micro-Credential Roadmap: Currency, Cohesion and Consistency*. https://www.skillnetireland.ie/publication/a-micro-credential-roadmap-currency-cohesion-and-consistency/#:~:text=A%20Micro-Credential%20Roadmap%3A%20Currency%2C%20Cohesion%20and%20Consistency%20Date,transformative%20learning%20experiences%20for%20both%20employees%20and%20employers.

OECD. (2023). *OECD Skills Strategy Ireland: Assessment and Recommendations.* https://doi.org/https://doi.org/10.1787/d7b8b40b-en

Oliver, B. (2019). *Making micro-credentials work for learners, employers and providers.* Deakin University.

Pavlik, A. (2021, July). Help students share their stories with microcredentials, digital badges. The Successful Registrar, 1–5. https://doi.org/https://doi.org/10.1002/tsr.30852

Pirkkalainen, H., Sood, I., Padron Napoles, C., Kukkonen, A., & Camilleri, A. (2023). How might micro-credentials influence institutions and empower learners in higher education? Educational Research, 65(1), 40–63. https://doi.org/10.1080/00131881.2022.2157302

QQI. (2021). *Early exploration into Micro-credentials in Higher Education,* 2014-2020. https://www.qqi.ie/sites/default/files/2021-10/early-exploration-into-micro-credentials-in-higher-education-2014-20.pdf

Van Der Hijden, P., & Martin, M. (2023). *Short courses, micro-credentials, and flexible learning pathways: A blueprint for policy development and action* Policy paper FLE XIBLE LEARNING PATHWAYS IN HIGHER EDUCATION. www.iiep.unesco.org

Varadarajan, S., Koh, J. H. L., & Daniel, B. K. (2023). A systematic review of the opportunities and challenges of micro-credentials for multiple stakeholders: learners, employers, higher education institutions and government. In International Journal of Educational Technology in Higher Education (Vol. 20, Issue 1). Springer Science and Business Media Deutschland GmbH. https://doi.org/10.1186/s41239-023-00381-x

World Economic Forum. (2021). *Building a Common Language for Skills at Work A Global Taxonomy.*

Appendix

9

9 Appendix

MS Forms survey questions sent to N-TUTORR institutional leads.
For the below, the question type is indicated by a square bracket e.g. [Single choice Q] or [Likert type scale]

SECTION 1: ABOUT YOU AND YOUR INSTITUTION

Q1. Your name (First name, last name)

Q2. Your email address (to contact you for interview)

Q3. Select your institution (choose one from list) [Single choice Q]

- **a.** ATU
- **b.** DkIT
- **c.** IADT
- **d.** SETU
- **e.** MTU
- **f.** TU Dublin
- **g.** TUS

SECTION 2: MICRO-CREDENTIALS ON OFFER AT YOUR INSTITUTION

This section will ask you questions about micro-credentials and other short-term learning experiences available at your institution.

As part of WP 1.1. in Stream 1 we are currently conducting a scoping analysis of micro-credentials offered by Higher Education in Ireland, with a focus on the TU/IoT sector. An objective associated with this is to gather information on the usage and practice of micro-credentials and other short-term learning experiences at N-TUTORR institutions. Desired outcomes of this scoping analysis include (i) agreeing on a consistent definition and shared practice regarding micro-credentials usage and (ii) identifying potential ways that existing offerings by N-TUTORR institution partners may be combined/adapted to help meet industry/employer skill demands. Please keep this in mind when answering the following questions.

Q1. **Is the term 'micro-credentials' used at your institution?**

- **a.** Yes
- **b.** No
- **c.** I do not sure/I am not sure

Q2. **If yes, how is the term 'micro-credentials' described at your institution? [Open comment box]**

Q3. **If yes, how is the term 'micro-credentials' used at your institution? [Open comment box]**

Q4. **To the best of your knowledge, which of the following does your institution offer:** *Tick all that apply*

Q5. **Which of the following delivery formats best describe the learning experiences associated with micro-credentials currently available at your institution? Tick all that apply [Multiple choice Q]**

- **a.** My institution does not currently offer any micro-credentials
- **b.** Online learning
- **c.** On campus/offline learning
- **d.** Blended/Hybrid learning
- **e.** Other (please define)

Q6. **Write here any online sources which describe micro-credentials offered by your institution e.g. links to course catalogues. [Text Box]. Separate sources with a comma e.g. www.site1.com, www.site2.com. Please give a signpost on which type of material is being provided. If your institution does not currently offer any micro-credentials, skip this question**

Q7. **Do you have any documentation relating to the list of micro-credentials available at your institution? Please note we are not looking for a comprehensive list, but a source with the most information.**

Q8. **[Single choice Q]**

- **a.** Yes – please upload to MS teams site
- **b.** No

Q9. **Regarding such short-term learning experiences (e.g. micro-credentials, special purpose awards, supplemental awards) is there anything currently under development at your institution?**

- **a.** Yes
- **b.** No
- **c.** I am not sure

Q10. **If yes, please briefly describe the Micro-credential here, including person(s) involved in its development, course name, topic, delivery format and learning outcomes**

SECTION 3: MICRO-CREDENTIAL POLICY AT YOUR INSTITUTION

Q1. **Which policies/procedures are currently in place at your institution regarding short learning experiences such as micro-credentials, supplemental awards, special purpose awards etc? [Open comment box]**

Q2. **Does your institution currently have a policy specifically about micro-credentials? [Single choice Q]**

- **a.** Yes
- **b.** Not yet, it is currently in development – Skip next question
- **c.** No – skip to Q5
- **d.** I do not know/I am not sure – skip to Q5

Q3. **If Yes to Q1, did you upload the policy about micro-credentials to the MS teams group for N-TUTORR stream 1 micro-credentials? [Single choice Q]**

- **a.** Yes I have
- **b.** No I have not – please upload now

Q4. **Other than a formal policy, have you been communicated to by upper management about micro-credentials at your institution? [Single choice Q]**

- **a.** Yes
- **b.** No
- **c.** I do not know/I am not sure

Q5. **If yes to Q4, which of the following applies to the form of communication about micro-credentials that has been conveyed to you? Select all that apply and please upload to the MS teams group. [Multiple choice Q]**

- **a.** Emails to staff
- **b.** Circular/Memo
- **c.** Notice on staff intranet (e.g. Sharepoint communication site)
- **d.** Verbally
- **e.** Other (please specify)

Q6. **We are putting together a directory of all micro-credentials currently offered by N-TUTORR partners. Short learning experiences that are not currently referred to as micro-credentials (e.g. special purpose award, professional certificate) may qualify. Who is the best person(s) at your institution to contact to learn more about the current range of short learning experiences available at your institution? Write their name and contact email here. [Open comment box]**

Q7. **Have you anything else you would like to say regarding the offering, policy, implementation of practice relating to micro-credentials at your institution? [Open comment box]**

SECTION 4 – HOW THE N-TUTORR PROGRAMME CAN HELP YOUR INSTITUTION

Q1: **What could the N-TUTORR programme do that would help your institute in terms of developing policies, or offering micro-credentials at your institution? [open comment question]**

N-TUTORR Transforming Learning

HEA HIGHER EDUCATION AUTHORITY AN tÚDARÁS um ARD-OIDEACHAS

thea

Funded by the European Union
NextGenerationEU

Ollscoil Teicneolaíochta an Atlantaigh
Atlantic Technological University

DUNDALK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA DHÚN DEALGAN

Institute of Art, Design + Technology Dún Laoghaire

MTU

SETU Ollscoil Teicneolaíochta an Oirdheiscirt South East Technological University

TU DUBLIN

TUS

This document is a green paper, designed for discussion rather than as a final policy statement, and intended to serve as a foundation for dialogue and collaboration. We welcome and value feedback and suggestions in shaping the evolution of the concepts and ideas presented here.

How to cite this paper: *Carroll, S., Maguire, M., Ginty, C. (2023). Unlocking Pathways: A Needs Analysis of Micro-Credentials Offered by the TU Sector to Address Industry Skill Needs in Ireland. (Report No. 231v1). N-TUTORR. Retrieved from ISBN:978-1-7395019-0-7*

December 2023, version 1