ICoBC Taxonomy, Quality Criteria, and Quality Grid
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ICoBC

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PREFACE

The ICoBC (International Council on Badges and Credentials) is a network of educational, corporate, association, and government organizations that develops and promotes best practices on badges and credentials regionally and globally.

The ICoBC taxonomy, quality criteria, and quality grid is a concerted effort to present best practices and research as observed by various organizations such as Campus Ontario, the Commonwealth of Learning (COL), DeakinCo, Epprobate by Laneto, International Standardization Organization (ISO), Malaysian Qualifications Authority (MQA), Micro-credentials linked to the Bologna Key Commitments (MICROBOL), Micro-credentials Higher Education (MICROHE), New Zealand Qualifications Authority (NZQA), Organization for Economic Co-operation and Development (OECD), and the United Nations Educational, Scientific and Cultural Organization (UNESCO). These organizations represent some of the global regions such as Africa, Asia, Canada, Europe, the Pacific, and the US. The ICoBC taxonomy, quality criteria, and quality grid have been designed to draw upon current global developments in digital badges and credentials in the hope of enabling ease of comprehension related to the quality of micro-credentials and fostering recognition of informal, non-formal, and formal learning across providers. This report suggests guidelines for a taxonomy, quality criteria, and a quality grid built on the following four guiding features (in alphabetic order), that are; accessible, authentic, digital, and universal. The target group for these guidelines are for learners, employees, employers, program providers, and organizations of all sizes.

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EXECUTIVE SUMMARY

ICoBC, (International Council on Badges and Credentials) a network of educational, corporate, association and government organizations, develops and promotes best practices on badges and credentials regionally and globally. The ICoBC community collaborates in the following areas:

- Design of Badges & Credentials (curriculum, testing, verification)
- Use of Badges & Credentials (Internal marketing, practices)
- Taxonomies and alignment with official certification systems

This conducted desktop research for the proposed ICoBC taxonomy, quality criteria, and quality grid shows that all the major global organizations and stakeholders in education such as the Commonwealth of Learning (COL), the European Commission (EC), the International Council for Open and Distance Education (ICDE), the Malaysian Quality Assurance (MQA), the Organization for Economic Co-operation and Development (OECD), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the New Zealand Quality Assurance (NZQA), and others are currently strongly emphasizing the paradigm shift for the education and labor markets, as well as the movement toward lifelong learning and what goes with it-not least the movement toward badges and micro-credentials. Accordingly, there is an urgent need for the transition to digital micro-credentials for development.

This taxonomy, quality criteria, and quality grid are based on current research and discourse in the field. It is proposed to be universal and interoperable for use and implementation.

The target group for these guidelines are learners, employees, employers, program coordinators, and organizations of all sizes.

INTRODUCTION

The ICoBC, (International Council on Badges and Credentials) is a network of educational, corporate, association, and government organizations. The ICoBC's goal is to develop and promote best practices related particularly to the quality and impact of the design of learning on badges and credentials regionally and globally. Micro-credentials could be the next big disruptive force for up-skilling in workplaces, higher learning institutions, colleges, schools, and non-governmental organizations. Earning a micro-credential can involve completing activities, assessments, and projects, and the earner can receive a digital certificate or badge as proof of achieving the new credential. Badges and credentials are not new in societies as they have been used to mark achievements in many areas such as the military, industry, business, sports, and entertainment. Similarly, the landscape of post-secondary education is changing with the emergence of new credentials that appeal to millions of learners. These "alternative credentials" such as micro-credentials, digital badges, and industry-recognized certificates have expanded their scope considerably, driven by an increasing demand for upskilling, reskilling, and lifelong learning, as well as a sharp reduction in unit costs of delivery enabled by digitalization.

With that said, what are micro-credentials? According to the European Commission (2020), a micro-credential is a proof of the learning outcomes that a learner has acquired following a short accurately and transparently assessed learning experience. They are awarded a badge or credential upon the completion of short, stand-alone courses (or modules) done on-site or online (or in a blended format). Brown et. al. (2021) argues that while there is no globally accepted definition of micro-credits, the term refers to smaller units of study that are typically shorter than traditional forms of accredited learning and that lead to traditional qualifications such as degrees. They anticipate that micro-credentials will become an established and mature part of 21st century diploma ecology over the next five years. Moreover, while the global landscape of micro-credentials is currently disjointed across national boundaries, greater clarity and coherence will emerge as governments around the world increasingly align new credentialing developments with existing national qualifications frameworks. In addition, they suggest that the micro-credentialing movement also presents opportunities for governments and academia, in partnership with industry, to leverage new digital learning models.

According to the Institute for Credentialing Excellence (I.C.E.) (I.C.E., 2020), credentialing programs can serve many purposes; however, the ultimate purpose of most credentialing programs is protecting the public. This protection is normally provided through establishing standards, identifying the competencies needed in a profession, and providing information to consumers on individuals who have demonstrated a sufficient level of mastery related to the competencies. Furthermore, the I.C.E. emphasized that "credentialing" is an umbrella term that includes the concepts of accreditation, licensure, registration, professional certification, and education (e.g., certificate programs).

In reality, micro-credentials can meet the need for skills development across a vast range of subject areas such as the arts, business, humanities, law, medicine, science, and social sciences. The subject areas are limitless, and depending on the employee, one can award the employees a micro-credential in everything from customer service and email etiquette to front-end web development. Often micro-credentials focus on universities predominantly in the post-graduate space. Micro-credentials can even be effective in enhancing skills such as those typically covered in vocational education. After all, much of lifelong learning takes place within the workplace. In Australia, for example, the qualification framework for vocational education and training is broken down by: (i) Training Package; (ii) Qualification; (iii) Skill Set (where applicable); and (iv) Unit of Competency.

Part of the explanation for the growing interest in micro-credentials is that employers want to stay competitive by ensuring that their employees are constantly developing new skills as and when the need arises. In this way, micro-credentials are cost-efficient, time-efficient, and offers employees the opportunity to proactively pursue skills that benefit them the most. Moreover, micro-credentialing provides a way to map these career paths and quantify all types of skills. As the needs of society changed, and globalization and technology developed, micro-credentialing has become more popular (MICROBOL, 2020).

One area that has a huge impact in the adoption of badges and credentials is the re-organization of content. In today's fast-paced digital environment, learning boundaries are blurring. Students, employees, and just about anyone else want to enhance their competencies quickly and effectively as well as get a certification fast (Gallagher, 2016; The European Higher Education Micro-Credentials Consultation Group 2020). The European Higher Education Micro-Credentials Consultation Group (2020) has raised concerns with regards to the "instant gratification" and churning of micro-credentials to meet the demand, as it is better to first develop a clear understanding of the term micro-credentials and badges as well as the authentication and recognition of micro-credentials. The truth remains that certification is an equity issue. For most people, getting verifiable accreditation and certification is at the heart of why they have invested in higher education. Credentials may prove to be the real equalizers in the world of work, but they do raise critical questions about the function and the reputation of the higher education institutions. They also raise questions about value, stigma, and legitimacy.

Earning a micro-credential can involve completing activities, assessments, and projects; and the earner can receive a digital certificate or badge as proof of achieving their new credential. The micro-credential can be a one-off qualification, or it can be part of a mandated training pathway leading to a final overall qualification for the earner. Moreover, a business-entity can offer their own micro-certificate; or it can work with a reputable accredited course provider to develop a quality program and issue a micro-credential for competencies and learning achievements that are relevant to the workforce.

According to Murgatroyd (2020), relevance is determined by examining the skills needed in specific jobs as determined from interactions with employers, as indicated in job listings or employer surveys, or as foreseen to be relevant for the future of work. He further noted that if micro-credentials are to close the skills gap and be attractive to employers, then employers need to be much more directly involved in defining the scope, required competencies and capabilities, and assessment strategy for the credential.

With that said, there are various ways an organization can provide and assess the achievement or completion of a badge or a micro-credential. It is certainly important to provide the "content" as well as to "assess" the achievement of the content which could either be a skill, knowledge, or a specific competency. Content could be accessed within a training "room", "on the job", online sites, or even through field work. Additionally, assessment could be uploaded as an e-portfolio or the completion of a set of test questions. Moreover, staff could have the opportunity to attend local or international conferences to learn about skills, practices, and research in the field. Finally, employees could be asked to demonstrate that they can successfully apply their newly acquired skills in the field and workplace.

This report offers a general overview of micro-credentials and badges and explores some definitions of badges and credentials in existing literature. It also identifies several key criteria for credentials and badges based on an in-depth analysis of related literature. Most notably, it proposes a taxonomy on micro-credentials and badges for ICoBC to help enhance the quality criteria and quality grid. Finally, conclusions and further recommendations are provided.

WHAT ARE MICRO-CREDENTIALS AND BADGES?

Micro-credentials are mini qualifications that demonstrate skills, knowledge, and/or experience in a specific subject area or skill. They are also known as nano diplomas and are usually narrower than traditional qualifications such as diplomas or degrees. However, they can also be broad rather than specific. For example, one can have a micro-diploma for something as broad as data-driven marketing and pursue another micro-diploma that focuses on how to empower others in the workplace. Lastly, micro-credentials can also be issued for informal and non-formal learning.

Some Global Views and Concerns on Badges and Micro-Credentials

The United Nations Educational, Scientific and Cultural Organization (UNESCO) draws attention to how digital technologies are reshaping education and training systems and building new methods and systems of credentialing that can capture, recognize, and validate learning outcomes in new ways. In a context where the labor market and the education and training systems are increasingly internationalized, the growing mobility of people and jobs has major implications for

the way competences and qualifications are recognized, validated, and accredited across borders (UNESCO, 2020).

The Commonwealth of Learning (COL) (2019) argued that there are three critical global flows which have an impact on education and employment: finances, people, and data. As such, they argued for digital credentials for development. Furthermore, COL argued that at a time when technology is rapidly changing the way we teach and learn, it becomes important to respond quickly to the needs of the stakeholders. Fueled by a demand from learners for short and flexible forms of learning as well as from industry and employers for verified skills-based credentials, there has been a growing interest in micro-credentials. In response to this demand, COL has produced several initiatives around this field by developing knowledge resources which are relevant and practical such as the publication - Designing and Implementing Micro-Credentials: A Guide for Practitioners by Rossiter and Tynan (2019).

The Organization for Economic Cooperation and Development (OECD) emphasized that the landscape of postsecondary education is changing with the emergence of new credentials that appeal to millions of learners (Kato, Galán-Muros & Weko, 2020). The so-called "alternative credentials", such as micro-credentials, digital badges, and industry-recognized certificates, have expanded their scope considerably as a result of increasing demand for upskilling and reskilling. Moreover, it offers a sharp reduction in the unit cost of delivery enabled by digitization. Universities, businesses, and other institutions are actively offering alternative credentials to help learners acquire new skills, update their existing skills, and signpost their existing competencies.

However, the challenge remains that despite an increasing number of new credentials, there is still a great deal of uncertainty. To help address these challenges and bring greater clarity and quality to micro-credentials, numerous parties have contributed:

Contact North (2021) in Canada defined 10 Key Actions to Ensure Micro-Credentials Meet the Needs of Learners and Employers; namely, (i) Make a clear connection between learning modules, the credentials offered, and skills or qualifications frameworks; (ii) Employers are actually seeking; (iii) Engage employer organizations or professional bodies in the design of micro-credentials at the earliest possible stage; (iv) Strengthen the focus on demonstrable competencies and reduce the over-reliance on "soft" assessments of what the learner can actually do; (v) Launch a national conversation, perhaps facilitated by the Future Skills Centre in partnership with the Council of Ministers of Education Canada, on the portability of micro-credentials; (vi) Identify those micro-credentials that can be laddered into undergraduate and graduate programs and ensure they are nationally portable; (vii) Clearly identify the mode of delivery for each micro-credential; as not all will be online, (viii) Encourage employers to partner with colleges, universities, and Indigenous institutes in the design of work-based learning micro-credentials; (ix) Identify and develop assessment-only micro-credentials; and (x) Foster more collaboration within and between

provinces to strengthen the skills, competencies, and capabilities of Canadians seeking work or upskilling to improve their job prospect.

In Europe, a growing number of citizens need to update their knowledge, skills, and competences to bridge gaps between their formal education and the demands of a rapidly changing society and labor market. Furthermore, the recovery from the COVID -19 pandemic and the need to accelerate green and digital transformation also requires individuals to upskill or reskill. Maintaining and acquiring new skills is also important to enable active participation in society, ensure continuous personal, social and professional development, and promote employability and socio-economic innovation. However, without common standards that ensure quality, transparency, cross-border comparability, recognition, and transferability, micro-qualifications cannot reach their full potential.

As such, the European Commission has committed to developing a common definition and European standards for micro-credentials that are independent of the awarding body; and build as much as possible on existing instruments. The intention to develop a European approach to micro-credentials was announced in:

- the Council Resolution on a strategic framework for European cooperation in education and training, looking towards the European Education Area and beyond (2021-2030)
- the European Skills Agenda and
- the Digital Education Action Plan 2021-2027

According to the European Commission (2021), micro-credentials provide flexible, inclusive learning opportunities. The European approach to micro-credentials will help extend learning opportunities to citizens and strengthen the role of higher education, vocational education, and training institutions in lifelong learning. The European Commission defines that a micro-credential is a qualification that demonstrates learning outcomes gained through a short, transparently assessed course or module. Micro-credentials can be taken on-site, online, or in a mixed format. The flexible nature of these qualifications enables learning opportunities to be opened to citizens, including those in full-time employment. This makes micro-credentials a highly flexible, inclusive form of learning that enables the targeted acquisition of skills and competences. Micro-qualifications are offered by institutions of higher and vocational education (VET) as well as by private organizations. They can be particularly useful for people who:

- want to broaden their knowledge without undertaking a full higher education program;
- want to undertake further education or retraining to meet the demands of the labor market or to develop their career after taking up a job.

With that said, on 20 April 2021, the European Commission launched a 12-week public consultation on a European approach to microcredit cards for lifelong learning and employability.

The public consultation aimed to gather ideas for the development of: (i) a common definition for micro-credentials; (ii) European Union (EU) standards to enhance quality and transparency; (iii) and actionable next steps at the institutional, national and EU level.

In fact, DeakinCo (2021) posits that micro-credentials offer numerous benefits to employees, employers, and organizations of all sizes. If designed well, they can be flexible, transferable, and cost-effective to implement. Micro-credentials can also help to drive employee engagement and help employers to closely track employee development. Some of the most prominent benefits of micro-credentials highlighted by DeakinCo, include: (1) personalization for employees, (2) personalization for employers, (3) recognition, (4) structured approach to learning on the job, (5) recognition of soft and hard skills, (6) flexibility, (7) demand for flexible lifelong learning, (8) multidisciplinary roles, (9) employee engagement, (10) scalability, (11) training in emerging areas, (12) specialized skill sets, (13) deliver on demand, (14) address widening skills gap, (15) track and deliver training more effectively, (16) measure capabilities and track competitiveness.

The EPICA-Strategic Partnership for the Co-Design of an Innovative and Scalable e-Portfolio, (2020) a strategic partnership between Europe and Africa, was launched to bring together companies, organizations, and universities in Europe and Africa in order to design an innovative and scalable e-Portfolio that will improve the quality, visibility, and availability of new skills. This joint effort is made possible through co-funding from European Commission's Horizon 2020 research and Innovation Program. According to them Micro-Credentials can:

- be shared with employers/educational providers as verifiable records of learning
- promote flexible learning paths and the recognition of competencies gained outside formal curricula
- foster a competence-based approach in curriculum design
- support the definition of skills, competences, and learning-outcomes-based standards
- increase program transparency and comparability
- help showcase the achievements for which micro-credentials have been awarded including evidence and assessment enhancing their reliability
- make learning visible, portable, stackable and career-enhancing

Finally, the International Council for Open and Distance Education (ICDE) has termed a micro-credential and alternative digital credential (ADC), suggesting that a key characteristic of a micro-credential lies in it being a specific form of certification issued by an institution of higher education that attests the competence and capability of an individual to perform productively in the workplace, and, to some extent, in society. As such, ADCs are portable, useful, transferable, and easily understood (ICDE, 2019, p. 19). In addition, they argued that ADC's should not duplicate or displace a certification on an official transcript of an institution. This eliminates the possibility that an institution could issue two different certifications for the same competency. However, if

the traditional transcript course contains more granular components, a micro-credential could be issued from therein.

ICDE further suggested that micro-credentials:

- indicate the competencies and learning-achievements attained, as well as the steps, assessments, and evidence required to obtain them
- not be issued for unevaluated learning accomplishments, such as the mere completion of a series of tasks, attendance at events, or for learning that has not been assessed, as competency and learning accomplishment evaluation is very important.
- not be issued for the attainment of trivial or irrelevant competencies or learning
- be issued in accordance with its own unique set of criteria, such as a rubric form that is designed to measure the desired outcome for the competency or learning achievement
- be assessed by high quality assessors using published standards of competency and workplace experience as set by the institution; whereby some form of competency-based assessment or evaluation that requires a clear relationship between the assessment and the actual application of the competency or learning in the workplace is utilized in the process
- provide clearly defined criteria of assessment where the micro-credentials are issued in the same subject area at two or more levels of competency
- must be permanently recorded and retained by the issuing institution
- ensure the verification issuance process secures the earner's identity, guarantees the identity's authenticity, and safeguards the communication about them and their competencies from any type of tampering.

These global developments in the field of micro-credentials have helped pave the way for the institutionalization of micro-credentials and enhancing their quality, benefits, transparency, and validity. In order to support progress and address some of the current shortcomings of micro-credentials, the following sections will delve deeper into the definitions of micro-credentials and badges in order to propose a taxonomy for ICoBC, quality criteria and quality grid.

Definitions of Micro-credentials and Badges

In this section, various definitions of micro-credentials and badges are provided from a selection from different organizations and countries to give an overview on how micro-credentials are defined.

- *CEDEFOP* (2021) states that micro-credentials are often presented and promoted as a new way for individuals to build their own competency profile (portfolio) by collecting and "stacking" learning in a flexible way, at their own pace, and according to their own priorities. Although there is currently no consensus on the term and definition, many see

micro-credentials as a by-product of the proliferation of open online courses as Massive Open Online Courses (MOOCs). Accordingly, they are perceived as a way (often digital) to give visibility and value to primarily shorter learning courses and/or experiences. While much attention has been paid to the role of micro-credentials in academic higher education and their link to the proliferation of relatively low-cost and short-term MOOCs, their impact on continuing education and training in the labor market is less well known.

- *Commonwealth of Learning* (COL) observes that "…there is generally consensus that micro-credentials are short, verified courses or learning experiences providing successful candidates with a digital certification…" (COL, 2019, p.2)

- *ContactNorth* (2020*)* proposed the following key characteristics of micro-credentials:
    - a skills and competency-based focus for learning rather than time
    - short and focused on a narrow range of skills and competencies
    - competency is assessed as a demonstrable skill or behavior, varying across micro-credentials
    - quality-assured through peer and industry review
    - industry recognized; whereby many micro-credentials are co-developed with industry or based on statements from industry organizations about the skills and competencies they are looking for
    - personalized with the right combination of micro-credentials to meet individual learners' needs
    - modular and stackable, whereby some micro-credentials are "one off" learning and assessment experiences, while others are modules that can be stacked to create a qualification
    - shareable, in that the qualification is placed in a digital wallet or e-portfolio the learner can share with employers or education institutions

- *Coursera* argues that micro-credentials are understood as learning activities consisting of "more than a single course but less than a full degree" and which are labelled differently across providers, such as Micro Masters (edX), Nanodegree (Udacity) and Specialization (Pickard, 2018, p.5).

- *DeakinCo* (2017) posits that micro-credentials are mini qualifications that demonstrate skills, knowledge, and/or experience in a given subject area or capability. Also known as "nanodegrees", micro-credentials tend to be narrower in range than traditional qualifications and broader in focus rather than specific.

- *E-Campus Ontario* (2020) defines a micro-credential as a certification of assessed learning associated with a specific and relevant skill or competency. Micro-credentials enable rapid retraining and augment traditional education through pathways into regular postsecondary programming.

- *European Commission* (2020) frames a micro-credential as a credential that demonstrates proof of the learning outcomes that a learner has acquired following a short, transparently assessed learning experience.

- *European Higher Education Area* (EHEA) (European Commission, 2020) defines a micro-credential as a "subunit of a credential or credentials that confer a minimum of 5 ECTS and could accumulate into a larger credential or be part of a portfolio" (MicroHE Consortium, 2019).

- *Grönigen Declaration* (GDN, 2021) provides a position paper on the European Commission's broad-based consultative work to establish a definition for micro-credentials. They state that micro-credentials are at the inflection point where the critical elements that enable lifelong learning, credential access, and mobility come together in their most acute form. The Groningen Declaration Network (GDN) supports both establishing a comprehensive definition and advancing the broader acceptance of micro-credentials within the educational ecosystem. For micro-credentials to become widely accepted, there needs to be a mechanism, enabled by some agreed standard(s) or protocol(s), to validate the credential recipient's identity and credential. This is to ensure quality assurance and enable and promote recognition. Once micro-credentials have attained the maturity to provide such granularity, digital credentials in general will have made a significant step towards enabling lifelong learning.

- *Institute for Credentialing Excellence* (I.C.E). (2020) defines micro-credentials as the formal recognition awarded to an individual who has demonstrated attainment of a narrow (or specific or limited) scope of knowledge, skills, or abilities. The scope of the micro-credential can be as granular as a single skill or competency.

- *International Labor Organization* (ILO) argued that an "explosion" of online and micro-skills programs during the COVID-19 pandemic underlines the importance of lifelong learning for upskilling, retraining, and economic recovery.

- *MICROBOL* (2020, p. 1) views micro-credentials as small volumes of learning certified by credentials; whereby each micro-credential is designed to provide the learner with specific knowledge, skills, or competencies that respond to societal, personal, cultural, or labor market needs.

- *MicroHE Consortium* (2019) argue that micro-credentials can be defined as a "subunit of a credential or credentials that confer a minimum of 5 ECTS and could accumulate into a larger credential or be part of a portfolio".

- *Malaysian Qualification Agency* (MQA) (2020, p.4) define a micro-credential as a "…digital certification of assessed knowledge, skills, and competencies in a specific area

or field which can be a component of academic programs or standalone courses supporting the professional, academic, and personal development of the learners."

- *New Zealand Qualification Agency* (NZQA, 2018) state, "Micro-credentials are a coherent package of learning and assessment, typically smaller than a qualification, that certifies achievement of a specific set of skills and knowledge needed by industry and or community"

- *Oceania* tends to adopt a wider definition, and types of micro-credentials ranging from 5-40 credits are regarded as micro- credentials (New Zealand Qualifications Authority, 2019).

- *OECD* (2020, p. 9) refers to micro-credentials as alternative credentials and points out that they "are not recognized as standalone formal educational qualifications by relevant national education authorities".

- The *United States of America* (USA) adopts the definitions *offered* by the:
    - *Institute for Credentialing Excellence* (I.C.E.), which states, "The formal recognition is awarded to an individual who has demonstrated attainment of a narrow (or specific or limited) scope of knowledge, skills, or abilities. The scope of the micro-credential can be as granular as a single skill or competency";
    - and the *Digital Promise*, which states, "Micro-credentials are digital certifications that verify an individual's competence in a specific skill or set of skills" (Digital Promise, n.d.).

- *UNESCO* (2018:10) suggests that a micro-credential is a "…term that encompasses various forms of certifications, including 'nano-degrees', 'micro-masters', 'credentials', 'certificates', 'badges', 'licenses' and 'endorsements'.

From this literature review on micro-credentials, an ICoBC taxonomy, quality criteria, and quality grid emerged.

ICoBC TAXONOMY, QUALITY CRITERIA, AND QUALITY GRID

ICoBC Taxonomy

The aim of a taxonomy is to provide a classification; and as it relates to micro-credentials it can either be the different types of micro-credentials or the level/continuum by which a micro-credential is earned.

With regards to types, the *Badging Taxonomy of the International Association of Continuing Education and Training* (IACET, 2018) suggested the following types in their taxonomy: (i) Participation Badge; (ii) Contribution; (iii) Recognition Badge; (iv) Grade-Based Badge; (v) Level; (vi) Program Badge; (viii) Performance Badge; and (ix) Certification/License Badge.

Alternatively, the *Malaysian Qualification Agency for Higher Education* has identified the following types (taxonomy): (i) a micro-credential which is a component of an accredited program by a Higher Education Institution (HEI); (ii) a micro-credential which is a component of an accredited program of a consortium of HEIs; and (iii) stand-alone micro-credentials which can be courses in accredited programs or designed anew based on the special needs of the employers, industries, individuals for specific knowledge, skills, and competencies.

Based on current, international, state-of-the-art trends in the field of micro-credentials, the ICoBC recommends the following taxonomy for micro-credentials. This taxonomy is based on a continuum, as illustrated in Figure 1, and classified into three broad categories, namely: (i) for the individual; (ii) for a targeted community; and (iii) for the greater community.

Figure 1. ICoBC Taxonomy for Badges and Micro-credentials

This suggested ICoBC taxonomy provided a foundation for the evolved quality criteria and quality grid.

ICoBC Quality Criteria

According to a survey by ICDE (2019), it is argued that the criteria required to earn a badge or micro-credential are important to the overall design and success of the badge or micro-credential because they entail certain demands on learning. Criteria help establish parameters that are useful to earners, raters, and those who view the badge after it is awarded. Establishing a set of criteria for a badge or micro-credential provides a clear path for the earner and creates a learning claim with the person viewing the badge.

As such, accordingly, the ICDE suggests that the quality criteria should be applicable across a wide variety of use cases and issuer types (e.g., academic institution, employer, professional certification/qualification body), be rigorous but realistic, and balance the needs of key stakeholder groups (e.g., earners, employers, academic institutions, credential awarding bodies, government). The MicroHE (2020) suggests that the following ten key features are crucial for micro-credentials: (i) accessible; (ii) authentic; (iii) digital; (iv) exchangeable; (iv) focus on learners; (v) interoperability; (vi) modular; (vii) portable; (viii) stackable; (ix) trust; and (x) universal.

Based on the MicroHE (2020) features, ICoBC suggests the following as the overarching guiding quality criteria: (i) accessible; (ii) authentic; (iii) digital; (iv) and universal as illustrated in Fig 2. It is proposed that these four quality criteria markers are the bare-minimum requirements that guarantee the success of micro-credentials, their validity and reliability, their capacity to benefit learners sustainably, and their overall value to all parties involved.
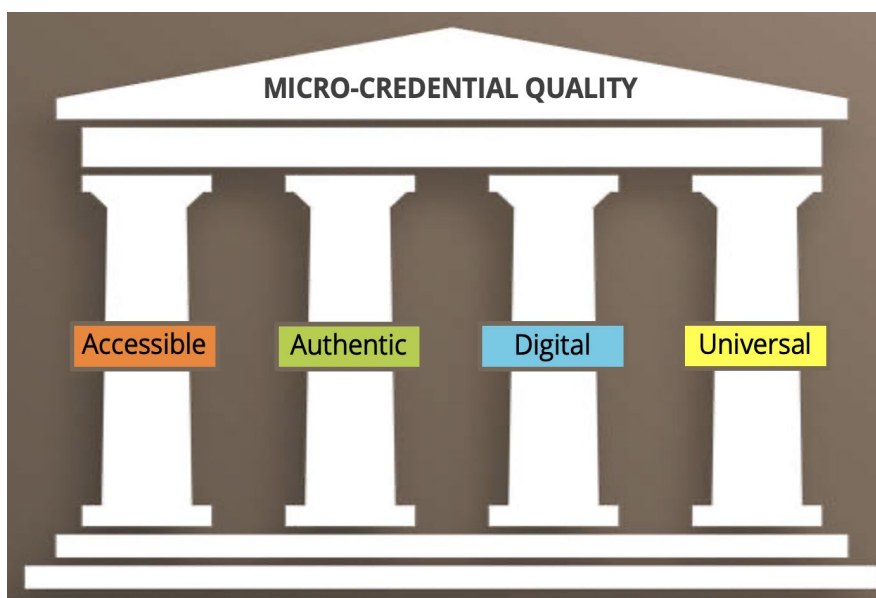
Fig. 2. ICoBC Quality Criteria

Moreover, these four quality criteria accessible, authentic, digital and universal can be further divided into 15 sub-criteria that help bring greater clarity by identifying the measurement parameters in micro-credential quality assessment. The sub-criteria include: (i) attainable; (ii) relevant; (iii) intuitive; (iv) validated; (v) robust; (vi) accurate; (vii) trust-worthy; (viii) portable; (ix) interoperable; (x) stackable; (xi) shareable; (xii) appearance; (xiii) assessment; (xiv) consistent; (xv) design principles. Table 1 below provides a summary of the quality criteria, sub-criteria, and descriptors.

Table 1. The ICoBC Quality Criteria for Badges and Micro-Credentials

CRITERIA	SUB-CRITERIA	DESCRIPTION
Accessible A micro-credential or a badge is **accessible** when it is easily obtained, visible, and easy to reach or download.	**Attainable**	The micro-credential is well described, the learning outcomes are accurately stated, and the contents and assessments are well matched up.
	Relevant	It addresses the learning problem and the need for it with appropriate content, skills, and competencies
	Intuitive	It is easy and natural to move through the micro-credential or badge and to learn, use, or understand the contents.
Authentic A micro-credential or a badge is **authentic** when it is accurate, validated, robust, and can be trusted, i.e., worthy of acceptance or belief as conforming to or based on "fact" and "not false or imitation." In other words, bona fide and genuine.	**Validated**	A micro-credential is authentic when it is validated by the institution and/or industry, company, business, enterprise, company, or corporation.
	Robust	It can withstand review and is able to hold up to its position within the stated description of what it intends to accomplish
	Accurate	The micro-credential is correct in all details and capable of reaching its intended outcome.
	Trust-worthy	The competencies earned are reliable and the earner can be trusted to demonstrate them.
Digital A micro-credential and or badge should ideally be **digital** so that it is more portable between communities, interoperable between systems, and easily stackable and shareable.	**Portable**	Able to be easily carried or moved. It is highly mobile and can be moved or integrated into different systems with ease.
	Interoperable	It has the ability to interact with and function within other platforms or systems.
	Stackable	The micro-credential or badge can be stacked to a larger certificate similar to a succession of courses needed to earn a degree.
	Shareable	It has a high portable currency and can be shared or replaced other similar credentials.
Universal A micro-credential and or badge is **universal** when it is recognized, validated, and accredited across borders.	**Appearance**	It is represented as a micro-credential or badge and not an extended course/MOOC/ degree-like program.
	Assessment	The assessment methods are universally accepted, varied in nature, and are competency based.
	Consistent	The learning design, layout, and interface comply to principles that are consistent to a micro-credential.
	Design Principles	It incorporates learning design principles that are more inclusive and amenable to diverse needs.

ICoBC Quality Grid

From the quality criteria developed in this report and the work of the New Zealand Quality Authority (NZQA, n.d.), the quality grid was developed. The proposed ICoBC quality grid for Badges and Micro-Credentials is illustrated in Appendix 2.

CONCLUSION AND RECOMMENDATIONS

The desktop research conducted for the proposed ICoBC taxonomy, quality criteria, and quality grid shows that globally all the major organizations and stakeholders in education such as UNESCO, OECD, COL, MQA, EC, ICDE, and more are currently strongly emphasizing the paradigm shift for the education and labor markets, as well as the movement toward lifelong learning and what goes with it-not least the movement toward badges and micro-credentials. As such, the urgent need for the development of digital credentials must be addressed.

As a network of educational, corporate, association, and government organizations, ICoBC's goal is to develop and promote best practices on badges and credentials regionally and globally. The ICoBC community collaborates in the following areas:
- Design of Badges & Credentials (curriculum, testing, verification)
- Use of Badges & Credentials (Internal marketing, practices)
- Taxonomies and alignment with official certification systems

This research has proposed an ICoBC Micro-Credentials taxonomy that is universal and interoperable based on current research and discourse in the field. Moreover, it also proposes ICoBC quality criteria, a quality grid for Badges and Micro-Credentials for use and implementation. Finally, an ICoBC standard for Badges and Micro-Credentials has also been developed to help guide the quality and validity of future micro-credentials.

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APPENDICES

Appendix 1: List of Definitions and Abbreviations

Definitions

Alternative Digital Credential: An Alternative Digital Credential (ADC), often referred to as a digital badge, is a fully digital, information-rich record of professionally relevant skills and competencies needed in the workplace. ADCs provide an alternative way to recognize specific skills not always visible on a traditional educational transcript.

Badges: A badge is a symbol or indicator of an accomplishment, skill, quality, or interest. A "digital badge" is an online record of achievements, tracking the recipient's communities of interaction that issued the badge and the work completed to get it. Digital badges can support connected learning environments by motivating learning and signaling achievement both within communities as well as across communities and institutions. (Source: Erin Knight's White Paper)

Micro-Credentials: A micro-credential is a proof of the learning outcomes that a learner has acquired following a short, transparently assessed learning experience. They are awarded upon the completion of short stand-alone courses (or modules) done on-site or online (or in a blended format) (Source: European Commission)

MICROBOL: The MICROBOL project (*Micro-credentials linked to the Bologna key commitments*) supports ministries and stakeholders in exploring, within the Bologna Process, whether and how the existing Bologna tools can be used and/or need to be adapted to be applicable to micro-credential(Source: https://micro-credentials.eu/about-2/microbol/

MicroHE: Micro-credentials Higher Education: MicroHE aims to provide the most comprehensive policy analysis yet conducted of the impact of modularization, unbundling and micro-credentialing in European Higher Education. Source: https://micro-credentials.eu

Taxonomy: Taxonomy is the practice and science of categorization or **classification** based on discrete sets. A taxonomy is the study of the general principles of scientific classification: systematics. In this context a taxonomy is on the different natures of micro-credentials

Unbundling: Is a neologism that describes how the 21st century ubiquity of mobile devices, internet connectivity, consumer web technologies, social media, and information access affects older institutions (education, broadcasting, newspapers, gaming, shopping, etc.) by "breaking down the packages they once offered (possibly even for free) and offering certain parts of them at a scale and cost unattainable by the old order." Unbundling has been called "the great disruptor." Source: Wikipedia

Quality Grid: a network of lines that cross each other to form a series of squares or rectangles. A framework of spaced bars that are parallel to or cross each other. In this context a quality grid is on standards and features for micro-credentials

List of Abbreviations

ADC: Alternative Digital Credential

COL: Commonwealth of Learning

EADTU: European Association of Distance Teaching Education

EC: European Commission

ICDE: International Council for Open and Distance Education

I.C.E.: Institute for Credentialing Excellence

ICoBC: International Council on Badges and Credentials

ILO: International Labor Market

ISO: International Organization for Standardization

MICROBOL: The MICROBOL project. Micro-credentials linked to the Bologna key commitments

MICROHE: Micro-credentials Higher Education

MQA: Malaysian Qualifications Agency

NZQA: New Zealand Qualifications Agency

OECD: Organisation for Economic Co-operation and Development

UNESCO: United Nations Educational, Scientific and Cultural Organization

Appendix 2: Quality Grid for Badges and Micro-Credentials

The ICoBC QUALITY GRID FOR BADGES AND MICRO-CREDENTIALS

Date and Place of Review:	
Learner Data:	
Contact Details:	
Badge/Micro-credential Overview:	
Title of Badge/Micro-credential:	
What is the purpose of the Badge/Micro credential?	[To be added] *Examples include:* *To raise awareness of … [Citizen]* *To develop skills in … [Worker]* *To show how to do … [Maker]* *To help you to go from … to …* *[Entrepreneur]*
What is the type/s of Badge/Micro-credential	*Stand-alone* *Stackable*
Badge/Micro-credential Context	*Formal* *Non-Formal* *Students* *Upskilling of staff in business*
Delivery Mode	*Online (Synchronous only or Asynchronous only)* *Blended* *On-site (Physical F2F)*
Description (especially learning intervention)	
Learning Outcomes	
Number of Learning Hours/ECTS/Credits	
Duration Hours/days/weeks	
Evaluation grade	[To be added]

Badge/ Micro-credential Evaluation					
Features	**Criteria**	*Very good*	*Good*	*Poor*	*Very Poor*
Accessible A micro-credential or a badge is **accessible** when it is easily obtained, visible, and easy to reach or download.	Attainable: The micro-credential is well described, the learning outcomes are accurately stated, and the contents and assessments are well matched up.				
	Relevant: It addresses the learning problem and the need for it with appropriate content, skills, and competencies.				
	Intuitive: It is easy and natural to move through the micro-credential or badge and to learn, use, or understand the contents.				
Authentic A micro-credential or a badge is **authentic** when it is accurate, validated, robust, and can be trusted, i.e., worthy of acceptance or belief as conforming to or based on "fact" and "not false or imitation." In other words, bona fide and genuine.	Validated: A micro-credential is authentic when it is validated by the institution and/or industry, company, business, enterprise, company, or corporation.				
	Robust: It can withstand review and is able to hold up to its position within the stated description of what it intends to accomplish.				
	Accurate: The micro-credential is correct in all details and capable of reaching its intended outcome.				
	Trust-worthy: The competencies earned are reliable and the earner can be trusted to demonstrate them.				
Digital A micro-credential and or badge should ideally be **digital** so that it is more portable between communities, interoperable between systems, and easily stackable and shareable	Portable: Able to be easily carried or moved. It is highly mobile and can be moved or integrated into different systems with ease.				
	Interoperable: It has the ability to interact with and function within other platforms or systems.				
	Stackable: The micro-credential or badge can be stacked to a larger certificate similar to a succession of courses needed to earn a degree.				
	Shareable: It has a high portable currency and can be shared or replaced other similar credentials.				
Universal	Appearance: It is represented as a micro-credential or badge and not an extended course/MOOC/ degree-like program.				

A micro-credential is **universal** when it is recognized, validated, and accredited across borders.	Assessment: The assessment methods are universally accepted, varied in nature, and are competency based.				
	Consistent: The learning design, layout, and interface comply to principles that are consistent to a micro-credential.				
	Design principles: It incorporates learning design principles that are more inclusive and amenable to diverse needs.				

Appendix 3: ICoBC Guidelines for Learners

Overview of ICOBC Guidelines for Learners

DEFINITION

A micro-credential is a proof of the learning outcomes that a learner has acquired following a short, transparently assessed learning experience. They are awarded upon the completion of short stand-alone courses (or modules) done on-site or online (or in a blended format) (Source: European Commission)

TAXONOMY

The ICoBC recommends the following taxonomy for micro-credentials. This taxonomy is based on a continuum, as illustrated in Figure 1, and classified into three broad categories, namely: (i) for the individual; (ii) for a targeted community; and (iii) for the greater community.

QUALITY CRITERIA

The ICoBC quality criteria consist of the following broad categories: (i) accessible; (ii) authentic; (iii) digital; (iv) and universal