



Competency Micro-Credentials and Graduate Employability Signaling

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Abstract

Graduate employability increasingly depends not only on possessing formal qualifications but also on making specific competencies visible, credible, and interpretable to prospective employers. OECD analysis published in 2026 identifies skills signaling as an expanding feature of skills-first labor markets, supported by digital profiles, skills passports, verified records, and other mechanisms that make acquired capabilities more visible to recruiters. Micro-credentials potentially strengthen this signaling function because they can certify narrowly defined learning outcomes and provide structured evidence concerning the issuer, assessment, criteria, and demonstrated skill.

This paper develops a competency-oriented micro-credential framework for graduate employability signaling. The proposed model distinguishes simple participation badges from assessed competency credentials and argues that labor-market value depends upon six factors: competency specificity, assessment credibility, issuer trust, evidence visibility, interoperability, and alignment with recognizable occupational or skills frameworks. Current Open Badges 3.0 infrastructure can encode information concerning credential issuers, criteria, evidence, achievements, and framework alignment, while the 1EdTech TrustEd Credential framework introduced additional metadata expectations concerning demonstrated skills, evidence artifacts, assessment, results, accreditation status, and framework alignment.

The study adopts a conceptual-methodological design with explicitly simulated comparative analysis. A degree-only signaling configuration is compared with a degree-plus-competency-micro-credential configuration across skill specificity, employer interpretability, verification, currency of skills, portfolio differentiation, and stackability. The simulated model indicates stronger signaling capacity when conventional degrees are supplemented by rigorously assessed, verifiable, skill-specific credentials. These values are methodological illustrations and do not represent measured graduate employment outcomes. The argument is supported by emerging empirical evidence: Kassi and Lehdonvirta found that microcredentials reduced employer uncertainty in an online labor market, while Athey and Palikot's large randomized study found that encouraging credential visibility increased employment outcomes, particularly among learners with weaker baseline employability.

The paper concludes that micro-credentials should not be positioned as automatic substitutes for university degrees. Their strongest employability function is complementary: broad qualifications communicate educational attainment and disciplinary formation, whereas competency micro-credentials can communicate recent, granular, verified capabilities. Their signaling value will remain limited, however, unless higher-education institutions establish transparent standards for assessment, issuer



quality, competency definitions, employer relevance, interoperability, and credential lifecycle management.

Keywords: micro-credentials, graduate employability, competency signaling, digital credentials, skills-first hiring, higher education, Open Badges, employability skills, labor-market signaling, credential transparency

1. Introduction

Graduate employability has traditionally been signaled through degrees, academic classifications, institutional reputation, work experience, and references. These signals remain influential because they provide employers with compressed information about educational achievement and candidate preparation. Labor markets are nevertheless moving toward greater emphasis on identifiable skills alongside conventional qualifications. OECD's 2026 analysis of skills-first labor markets reports that skills signaling is expanding across member countries and that employers increasingly use digital skills information during recruitment. The same report notes that skill-based filters were used in nearly 15% of candidate searches examined across OECD countries in 2023–2024, compared with approximately 2% using degree-based filters.

Micro-credentials have developed within this changing environment as short, focused records of learning that certify particular learning outcomes. The European Commission describes them as records certifying learning outcomes from shorter learning experiences and emphasizes their potential for flexible acquisition of knowledge, skills, and competences. The European approach also recognizes that their value depends upon quality, transparency, comparability, recognition, and portability rather than simply their digital form. OECD assessments likewise observe growing interest in micro-credentials for upskilling, reskilling, academic advancement, and personal development but caution that evidence about their labor-market impact remains incomplete.

The employability potential of micro-credentials is best interpreted through signaling theory. Employers rarely observe a candidate's complete skill set directly before hiring and therefore depend upon signals that reduce uncertainty regarding productivity, capability, or role fit. Kassi and Lehdonvirta examined a voluntary microcredentialing scheme in an online labor platform and found that credential acquisition increased earnings through reduced employer uncertainty rather than through an observed productivity increase, providing unusually direct evidence that credential information can operate as a labor-market signal. Athey and Palikot's randomized experiment involving more than 800,000 online certificate earners similarly found that interventions encouraging credential sharing increased employment, with stronger effects among learners who had weaker baseline employability.

Yet not every micro-credential can function as a strong employability signal. A badge indicating webinar attendance carries different information from a credential earned through an assessed project demonstrating applied competence. Employer interpretation can also depend on issuer reputation, clarity of the represented skill, recency, evidence of assessment, and relevance to the vacancy. A 2024 qualitative study involving Australian employers found generally positive perceptions toward higher-education micro-credentials but also concluded that their effectiveness depended significantly on characteristics of learners, employers, and providers. Bruguera and colleagues' employer-focused work



similarly reports that micro-credentials can signal curiosity, continuing learning, and specific skill development, while highlighting the importance of design and employer understanding.

This paper therefore examines competency micro-credentials, meaning micro-credentials in which an identifiable skill or competency is connected to explicit criteria, assessment, and preferably evidence of achievement. The study argues that their strongest graduate-employability role is not replacing traditional qualifications but reducing information asymmetry around capabilities that conventional transcripts may communicate poorly. The analysis develops a signaling-quality framework, identifies governance conditions required for employer trust, and uses an explicitly simulated comparison to demonstrate how adding well-designed competency micro-credentials may strengthen a graduate's employability profile.

2. Objectives of the Study

2.1 To Define the Employability-Signaling Function of Competency Micro-Credentials

The first objective is to distinguish micro-credentials that merely document participation from those that provide credible evidence of competence. The framework treats a strong employability signal as one that enables an employer to determine what the graduate can do, how that capability was assessed, who verified it, when it was demonstrated, and how it relates to a recognizable occupational or skills framework.

This distinction is supported by contemporary digital-credential standards. Open Badges can include issuer information, criteria, relevant evidence, and links to external frameworks, while 1EdTech's TrustEd Credential framework requires skill identification, evidence, assessment information, results, issuer-accreditation information, and framework alignment for its more rigorous credential category.

2.2 To Examine Employer Interpretability and Trust

The second objective is to evaluate which characteristics make competency credentials understandable and credible during recruitment. Employer interpretation is treated as an intermediary variable between credential possession and employability outcomes.

A credential cannot generate a strong signaling effect when the employer does not understand its meaning, cannot identify the awarding authority, cannot determine the rigor of assessment, or cannot connect the skill with the requirements of the role. Employer-focused research currently suggests potential value but also demonstrates that awareness, organizational practices, provider credibility, and learner characteristics influence perceived usefulness.

2.3 To Develop a Complementary Degree–Micro-Credential Model

The third objective is to formulate a model in which micro-credentials supplement rather than mechanically displace conventional higher-education qualifications.

The degree is conceptualized as a broad signal of sustained disciplinary study and academic achievement, while competency micro-credentials add granular, current, and potentially occupation-specific information. This complementary model is consistent with current policy approaches that



position micro-credentials as flexible learning records that can stand alone, complement larger programs, or become stackable within broader educational pathways.

3. Review of Literature

3.1 Micro-Credentials, Skills Signaling, and Employability

Micro-credentials have attracted substantial policy interest because of their potential to provide shorter and more flexible pathways for developing specific skills. OECD's 2023 policy analysis describes micro-credentials as increasingly prominent in education, training, and labor-market policy while simultaneously cautioning that robust evidence of their impact remains limited. Earlier OECD analysis had already documented growing offerings across higher-education systems and identified reskilling, upskilling, academic advancement, and personal development among their prominent use cases.

Their relevance to graduate employability becomes clearer when micro-credentials are situated within contemporary skills-signaling behavior. OECD's 2026 skills-first report defines skills signaling as the process by which individuals explicitly communicate capabilities to employers and links this visibility to recruitment based upon actual skills. The report documents increasing use of skills information on digital platforms and notes growing government experimentation with skills passports and verified skill records.

Empirical labor-market research provides evidence that credential signals can have measurable effects. Kassi and Lehdonvirta's study of an online labor platform found that a voluntary skill microcredential increased workers' earnings through reduced uncertainty among employers rather than through increased productivity. Their analysis therefore supports a classic signaling mechanism: the credential helped purchasers distinguish workers before contracting.

Athey and Palikot provide a complementary large-scale result. Their randomized experiment involved more than 800,000 learners without college degrees who had earned online certificates. Encouraging and simplifying credential sharing increased new employment by 6%, with larger effects for jobs related to the certificates and for learners with relatively weak baseline employability. Their counterfactual résumé analysis also found substantial improvements in perceived candidate quality for weaker résumés. These findings do not prove that every university micro-credential will increase graduate employment, but they demonstrate that credential visibility itself can reduce information frictions in labor markets.

3.2 Employer Recognition, Assessment Credibility, and Credential Quality

The signaling value of a micro-credential depends upon the receiver. Employers need sufficient information to interpret what a credential represents and whether it distinguishes a candidate meaningfully. Nguyen and colleagues' qualitative study of eleven Australian employers found generally positive perceptions of higher-education micro-credentials but also identified context-dependent challenges and enabling factors associated with learners, employers, and educational providers. The finding is significant because it challenges the assumption that issuing a digital badge automatically creates labor-market value.

Employer interpretation is particularly important for transversal or soft competencies. Bruguera and colleagues examined employers' perspectives on micro-credentials for soft skills and found that such



credentials can communicate attributes including continuing learning orientation and capability development, but their signaling effectiveness depends on the credibility and meaning of the credential. Soft skills are particularly difficult to credential because broad labels such as “leadership,” “communication,” or “critical thinking” may conceal substantial differences in assessment rigor.

Credential design must therefore answer a series of questions. What competency was assessed? What task produced the evidence? What standard was applied? Who assessed the work? What result did the learner achieve? Is the issuer recognized? Is the skill connected to an external framework? Can the employer inspect supporting evidence? These questions increasingly appear in digital-credential governance standards. Open Badges 3.0 supports issuer identity, earning criteria, evidence, and competency-framework alignment. The revised 1EdTech TrustEd framework goes further by requiring identifiable skills, external framework alignment, accreditation information, evidence artifacts, assessment information, and achievement results for its higher-rigor credential category.

Quality is also a policy concern. The European approach to micro-credentials explicitly states that common standards for quality, transparency, recognition, portability, and comparability are necessary for their wider potential to be realized. OECD's assessment of micro-credential quality similarly emphasizes that proliferation alone does not establish value.

3.3 Stackability, Credential Inflation, and the Limits of Signaling

Micro-credentials are frequently described as stackable, meaning that several smaller learning achievements may accumulate toward larger educational outcomes or communicate a developing portfolio of competencies. UNESCO IESALC's 2025 mapping work in Latin America and the Caribbean describes microcredentials as formal records of smaller learning units that may complement larger programs or be stackable toward degrees. Stackability can increase their value by connecting short learning experiences with coherent educational pathways rather than leaving them as isolated fragments. However, the expansion of micro-credentials creates a potential signaling paradox. If the number of credentials grows faster than employers' capacity to interpret their meaning, additional credentials may create noise rather than clarity. UNESCO IESALC explicitly warned in 2025 that uncontrolled expansion could contribute to market saturation and credential inflation, potentially weakening value and fragmenting learning pathways.

This concern is especially relevant to graduates who may feel pressure to accumulate numerous badges in an attempt to differentiate themselves. A labor-market signal is useful when it is sufficiently scarce, interpretable, and correlated with something employers value. A long list of minimally assessed credentials may be less useful than a small portfolio of rigorous credentials linked to genuine applied evidence.

The literature therefore suggests a research gap between credential availability and credential signaling quality. Much policy attention has focused on expanding provision and interoperability, while employer research is still relatively limited. OECD itself has repeatedly noted that evidence concerning the actual value and impact of micro-credentials remains less developed than policy enthusiasm. The present study addresses this gap conceptually by examining which credential characteristics should strengthen employability signaling and how those characteristics can be operationalized.

4. Research Methodology

4.1 Research Design

The study adopts a conceptual-methodological design with simulation-based employability signaling analysis. No graduates were surveyed, no employers were experimentally assigned résumés, and no administrative employment records were collected.

The conceptual framework was developed through synthesis of current OECD work on skills-first labor markets and micro-credentials, European micro-credential policy, 1EdTech credential standards, UNESCO micro-credential governance work, and empirical labor-market research examining credential signaling and employer perceptions.

The quantitative component uses simulated scores solely to demonstrate how credential configurations could be compared. No numerical value is presented as an observed effect of micro-credentials on graduate employability.

4.2 Competency Micro-Credential Signaling Framework

A strong competency credential is modeled as a combination of six signal-quality elements.

Table 1: Competency Micro-Credential Framework for Graduate Employability Signaling

Signaling Dimension	Core Question	Strong Credential Characteristic	Employability Function
Competency Specificity	What precisely can the graduate demonstrate?	Narrowly defined skill or capability with clear learning outcomes	Reduces ambiguity about candidate capability
Assessment Credibility	How was competence established?	Authentic task, project, performance assessment, rubric, or validated examination	Distinguishes demonstrated competence from attendance
Issuer Trust	Who stands behind the credential?	Recognized university, professional body, employer, or credible joint issuer	Increases confidence in the signal
Evidence Transparency	Can the claim be inspected?	Portfolio artifact, assessment result, project evidence, or verified performance record	Enables deeper employer verification
Skills-Framework Alignment	How does the competency relate to external requirements?	Mapping to recognized occupational, sector, or competency taxonomy	Improves comparability and employer interpretation

4.3 Simulation Procedure

Two signaling configurations were developed.

- The Degree-Only Signaling Model represents conventional graduate communication through a degree title, transcript, institution, and general résumé information.
- The Degree + Competency Micro-Credential Model retains the traditional degree while adding selectively chosen, assessed, digitally verifiable competency credentials aligned to specific employability requirements.

Six comparative dimensions were scored from 0 to 100: skill specificity, employer interpretability, verification, currency of skills, portfolio differentiation, and stackability.

The scores represent the expected information richness of the signaling configuration, not the probability of obtaining employment.

5. Analysis

5.1 Comparative Employability-Signaling Performance

Table 2: Simulated Comparison of Degree-Only and Micro-Credential-Enhanced Graduate Signaling

Signaling Dimension	Degree-Only Signal	Degree + Competency Micro-Credentials	Simulated Difference
Skill Specificity	55	91	+36
Employer Interpretability	72	88	+16
Verification	62	93	+31
Currency of Skills	48	89	+41
Portfolio Differentiation	51	86	+35
Stackability	44	84	+40

Note: All values are author-generated simulated scores and do not represent measured employment probabilities, employer preferences, or graduate outcomes.

The largest simulated improvement occurs in currency of skills. Degrees provide durable evidence of education but may have been completed several years earlier and typically contain limited information about subsequently acquired or rapidly evolving competencies. Micro-credentials can potentially provide more current evidence of learning in areas such as artificial intelligence, data analytics, sustainability, cybersecurity, project methods, digital communication, or other rapidly

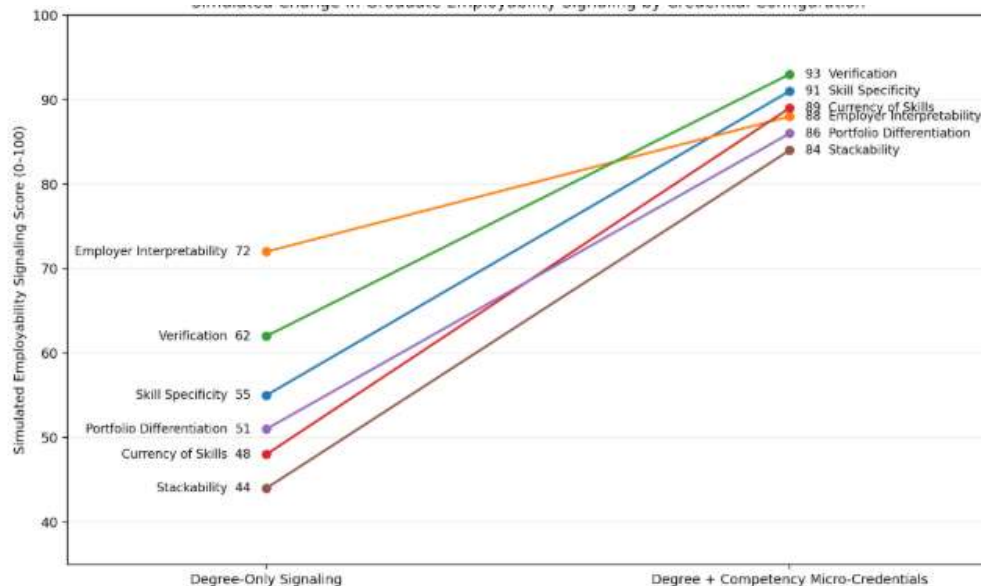
changing fields. OECD's skills-first analysis emphasizes the growing importance of communicating current skills as labor-market requirements evolve.

Stackability also improves substantially because competency credentials can accumulate into a more granular learning portfolio. Current micro-credential policy frameworks explicitly recognize stackability and integration into larger qualifications as possible design features.

Verification increases from a simulated 62 to 93 because digital credential standards permit structured metadata, issuer identification, digital signatures, criteria, and evidence. Open Badges 3.0 credentials are digitally signed and compatible with the W3C Verifiable Credentials model.

5.2 Slope-Chart Analysis of Signaling Enhancement

Graph 1: Simulated Change in Graduate Employability Signaling from Degree-Only to Degree-Plus-Competency-Micro-Credential Configuration



The slope chart shows upward movement across all six signaling dimensions. The steepest changes occur in skill currency, stackability, skill specificity, portfolio differentiation, and verification. Employer interpretability improves more moderately because a university degree is already a widely understood labor-market signal.

This distinction is theoretically important. Micro-credentials are unlikely to outperform degrees on every information dimension. Traditional qualifications possess established recognition and broad institutional meaning, whereas competency credentials provide additional granularity.

The strongest profile therefore emerges through complementarity. The degree communicates sustained educational attainment; the micro-credential communicates a more specific capability. This combination is consistent with employer research showing interest in micro-credentials while also highlighting contextual conditions affecting their usefulness.

5.3 Proposed Graduate Employability Signaling Architecture

The analysis suggests that universities should avoid issuing micro-credentials simply because digital badging technology is available. Credential design should begin with an identifiable labor-market competency and a defensible assessment.

The first component is competency definition. Universities should identify the exact knowledge, capability, or applied behavior being certified. Vague credentials such as “Workplace Excellence” provide limited signaling information unless the represented competencies are explicitly defined.

The second component is authentic assessment. A credential for data visualization might require completion of an evaluated dashboard project. A credential for scientific communication might require production and defense of an evidence-based research presentation. A credential for project leadership could require demonstrated planning, risk analysis, stakeholder communication, and reflective evaluation. Current TrustEd credential metadata explicitly emphasizes evidence, criteria, assessment, results, and defined skills, illustrating the direction in which digital credential rigor is evolving.

The third component is employer-readable metadata. Employers should not need to open a long course syllabus to understand what the credential means. Information should include skill title, issuer, competency definition, assessment method, proficiency level where applicable, date of achievement, evidence, framework alignment, and verification information.

The final component is portfolio selectivity. Graduates should be encouraged to present credentials relevant to a specific vacancy rather than displaying every badge they have accumulated. This approach reduces credential noise and strengthens the signaling relationship between the candidate's demonstrated competency and the employer's requirements.

6. Discussion

6.1 Micro-Credentials Are Most Valuable When They Reduce Employer Uncertainty

The primary theoretical contribution of the study is the distinction between learning value and signaling value. A micro-credential can provide meaningful learning yet remain a weak employment signal if employers cannot interpret it. Conversely, a credential can become valuable in recruitment when it communicates difficult-to-observe information about candidate capability. Kassi and Lehdonvirta's labor-platform evidence is particularly important because they found that the economic benefit of microcredentials operated through reduced employer uncertainty rather than increased worker productivity.

This mechanism explains why assessment evidence matters. If a recruiter sees only a badge title, uncertainty may remain high. If the recruiter can determine that the badge was issued by a recognized university after assessment of a real-world project aligned to an external skills framework, the credential carries substantially richer information.

Athey and Palikot's randomized evidence provides a complementary lesson: credentials must also be visible. Their intervention increased credential sharing and employment outcomes among certificate earners, with particularly strong effects among candidates with weaker baseline employability. A credential hidden within an institutional student system cannot perform a labor-market signaling role. Learner-controlled sharing, résumé integration, digital portfolios, and professional-network visibility are therefore part of employability infrastructure.



At the same time, signaling advantages are likely to vary across graduates. A candidate already possessing a highly prestigious degree, extensive work experience, strong portfolio, and established professional reputation may gain relatively little from an additional small credential. A graduate with limited work experience, an interdisciplinary degree, or a nontraditional background may gain more because the credential supplies information that the employer would otherwise lack. This interpretation is consistent with Athey and Palikot's finding that effects were concentrated among people with weaker baseline employability.

6.2 Employer Trust Requires Standardization Without Eliminating Educational Diversity

A central challenge for micro-credential ecosystems is balancing standardization and diversity. Universities should retain the freedom to design learning appropriate to their disciplines, regions, and industries. Employers, however, need sufficient consistency to interpret credentials efficiently.

The European approach attempts to address this tension by establishing common descriptive elements and design principles while allowing different providers to issue credentials. Its objective is to strengthen quality, transparency, portability, and recognition across institutions, businesses, sectors, and borders. Open Badges provides a technical mechanism through which credentials can contain comparable metadata, while 1EdTech's TrustEd work represents a more recent attempt to distinguish credentials containing richer evidence and quality information from basic recognition badges.

Such standards are important because digital appearance can create misleading equivalence. Two badges may look similar on a résumé while representing radically different achievement conditions. One may have required twenty hours of assessed applied work; another may have required only attendance. Employer trust therefore requires transparency about what was required to earn the credential. The labor-market signaling system becomes stronger when employers can distinguish participation, completion, proficiency, certification, and demonstrated competence.

Third-party endorsement may also matter. A university micro-credential co-designed or endorsed by a respected professional association, employer consortium, or sector body may communicate stronger occupational relevance, although such partnerships should not allow short-term employer preferences to replace broader academic judgment. The strongest model combines labor-market relevance with defensible educational quality.

6.3 Credential Proliferation Can Strengthen or Weaken Graduate Differentiation

Micro-credentials are often promoted as mechanisms for differentiation, but proliferation creates a risk that differentiation will decline over time. UNESCO IESALC's 2025 analysis explicitly warns that uncontrolled expansion may produce saturation and credential inflation. The logic is straightforward: when every small learning activity generates a credential, employers may stop distinguishing meaningful competence from ordinary participation.

Higher-education institutions should therefore resist the temptation to badge every course component. Credential scarcity is not inherently desirable, but signal discipline is. A credential should be issued when the achievement is sufficiently coherent, assessed, and useful to justify independent representation.



Graduate guidance is equally important. Students may mistakenly believe that the objective is to accumulate as many badges as possible. A stronger employability strategy would encourage a curated portfolio of three or four high-relevance credentials aligned with the target occupation and supported by evidence.

Stackability can mitigate fragmentation when smaller credentials form a coherent pathway. UNESCO and European policy frameworks both recognize the possibility that micro-credentials can complement or accumulate within broader educational programs. In such a model, micro-credentials become visible milestones within a structured competence-development pathway rather than disconnected digital objects.

The long-term value of competency micro-credentials will therefore depend less on their quantity than on their interpretive efficiency. Employers must be able to understand the signal quickly, graduates must be able to present it selectively, and institutions must maintain sufficient rigor for the signal to remain credible.

7. Conclusion

Competency micro-credentials have substantial potential to strengthen graduate employability signaling because they can communicate forms of capability that traditional degree documentation often leaves implicit. Degrees remain powerful signals of educational attainment, disciplinary preparation, and sustained academic engagement, but they generally provide limited granularity regarding recently acquired or highly specific competencies. Micro-credentials can fill this information gap when they clearly identify a skill, document how it was assessed, provide credible issuer information, contain evidence where appropriate, and remain digitally verifiable.

The simulation developed in this study illustrates the complementary signaling argument. Adding competency micro-credentials to the conventional degree increases simulated scores across skill specificity, employer interpretability, verification, skill currency, portfolio differentiation, and stackability. The strongest differences appear in skill currency and stackability, while employer interpretability shows a smaller increase because conventional degrees already possess widely recognized meaning. These values are methodological illustrations rather than empirical employment effects, but the pattern is consistent with existing evidence that nontraditional credentials can reduce employer uncertainty and that greater credential visibility can improve labor-market outcomes for some workers.

The employability value of micro-credentials should nevertheless not be assumed. Employer trust depends on assessment rigor, transparent competency definitions, recognized issuers, evidence quality, framework alignment, portability, and meaningful verification. Policy and technical developments are increasingly moving in this direction: the European approach emphasizes quality and transparency, Open Badges supports verifiable metadata and evidence, and 1EdTech's 2026 TrustEd framework requires detailed information on skills, assessment, accreditation, evidence, and results. These developments are important because the digital format of a credential is less consequential than the credibility of the achievement it represents.

The broader conclusion is that competency micro-credentials should function as high-resolution supplements to the broad signal provided by a university degree. Their purpose should not be to create

an endless collection of badges but to make meaningful competencies easier for employers to recognize and verify. Future empirical research should test employer responses through randomized résumé experiments, examine wage and hiring effects across industries, evaluate whether employer recognition differs according to credential issuer and assessment type, and investigate how many credentials can be displayed before information overload reduces signaling value. Universities should meanwhile design micro-credentials around authentic competence, verifiable evidence, occupational relevance, and transparent quality assurance rather than credential production itself.

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