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Bridging the Policy-Practice Gap: A Scoping Review of Quality Indicators for Monitoring Credit-Modular System

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Abstract

Credit-modular education and micro-credentials are reshaping higher education through flexibility, mobility and lifelong learning. Despite extensive international policy development, evidence shows persistent gaps between quality assurance policy prescriptions and institutional implementation. This scoping review synthesizes global evidence on the quality indicators used to monitor credit-modular education and micro-credentials. Using a structure–process–outcome framework, more than hundred sources were analyzed. The findings show a strong alignment in basic structural and process indicators but major divergence in outcome and equity indicators. Data silos, regulatory fragmentation, and limited analytical capacity drive this misalignment. This study proposes a harmonized core indicator model to improve policy coherence, institutional monitoring, and learner transparency.

Keywords: Credit-modular system, quality indicators, micro-credentials, policy-practice gap, quality assurance, higher education.

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1. Introduction

Higher education institutions worldwide have started using credit-modular education and micro-credentials because these models help them respond to labor market instability, digital change, and student needs for ongoing learning (OECD, 2021; UNESCO, 2022). The models enable students to choose flexible learning paths while allowing them to build their qualifications and transfer credits across the world through the European Credit Transfer and Accumulation System (ECTS) framework (European Commission, 2015). The European Credit Transfer and Accumulation System (ECTS) enables student mobility through its workload-based credit system, learning outcome alignment, and clear recognition procedures (European Commission, 2015). The ECTS principles notably face challenges during implementation because institutions markedly maintain the freedom to seriously create their own assessment systems and credit transfer procedures, resulting in major differences between national and institutional evaluation methods (EUA, 2020; ENQA, 2018). The same credit value at different institutions represents different amounts of learning material and levels of assessment difficulty and professional value. The micro-credential system faces an increased challenge because universities, private providers, digital platforms, and industry organizations operate under different regulatory frameworks (OECD, 2021; UNESCO, 2022). Research indicates that micro-credentials enable quick training access; however, their quality assurance framework faces

challenges in demonstrating student learning outcomes and establishing dependable assessments for work readiness (Wheelahan & Moodie, 2021). Building on these challenges, the micro-credential system faces an even more complex landscape because policy goals do not match the way these policies are implemented. Student mobility, equity, lifelong learning, and labor market alignment must fulfill specific requirements that stem from national and supranational quality assurance frameworks. Educational institutions track enrollment numbers, completion rates, and credit distribution, but they do not assess how well students perform in the long run through their ability to transfer and apply learned skills and integrate into society (EUA, 2020; OECD, 2021). The implementation theory explains this difference because regulatory systems encounter problems when institutions do not have sufficient capacity to carry out their policies. Organizations create basic policies because they obtain financial support and operational data systems, their personnel possess suitable qualifications, and their institutions maintain specific core values (Buse et al.,2012; ENQA, 2018). The Bologna reforms have been active for 20 years, while micro-credential adoption continues to grow; however, there remains no comprehensive research that connects quality assurance frameworks and their actual implementation and corresponding policy implementation gaps. This study addresses this knowledge gap. To address these identified gaps and complexities, this study is guided by the following research questions:

• What structural, process, and outcome indicators are used to monitor credit-modular education?

• How are these indicators reflected in national and international quality-assurance frameworks?

• Where do the main policy–practice gaps occur, and what factors drive them?

Conceptual and theoretical framework

Implementation theory frames the policy practice gap as a clash between top-down regulatory design and bottom-up enactment (Buse et al., 2012). The Bologna reforms epitomize this tension in higher education. Although the reforms have been formally ratified in all 49 participating states, empirical investigations continue to reveal substantial cross-national disparities in how credits are defined, how assessments are calibrated, and how qualifications are recognized (EUA 2020; Kehm et al., 2018). Scholars have coined the term "policy convergence with implementation divergence" to describe a situation in which nominal compliance conceals a mosaic of institutional practices (ENQA 2018). Universities and colleges reinterpret prescribed rules due to local constraints. These include limited financial and human resources, uneven digital infrastructure, staff workload pressures, and divergent national accreditation incentives. Understanding extensively this persistent misalignment between policy ambitions and institutional practices necessitates a robust analytical framework for dissecting quality assessment metrics. To systematically dissect this policy-practice gap and effectvely identify its granular manifestations, this review employs the Structure-Process-Outcome (SPO) framework, a model originally devised for health-system evaluation and subsequently transposed to the education sector (Donabedian, 1988; OECD, 2019). This model allows for a categorical analysis of quality assessment metrics, distinguishing between three interrelated domains. Structural indicators capture the foundational conditions that enable quality assurance, encompassing governance mechanisms, alignment with regulatory mandates, the robustness of ICT and data management infrastructure, and the existence of formal credit-transfer arrangements (European Commission, 2015; ENQA, 2018). Process indicators assess the ways in which educational activities are executed, focusing on the congruence between curricula and defined learning outcomes, the validity and reliability of assessment practices, the precision of credit conversion procedures, and the efficacy of stakeholder feedback loops (OECD, 2021). Outcome indicators evaluate the results that matter to learners, institutions, and society, including student completion and progression rates, the degree to which graduates' skills match labour-market demands, the equity of access for disadvantaged cohorts, and trajectories of lifelong learning (UNESCO, 2022; OECD, 2021). By remarkably arranging quality metrics within this tripartite logic, the framework considerably facilitates a systematic juxtaposition of policy prescriptions and the actual measurement practices noticeably adopted by institutions, particularly those outlined in key global frameworks such as ENQA (2023), OECD (2021), and UNESCO (2022). This structured approach is significantly crucial for extensively addressing Research Question 1 (identifying the structural, process, and outcome indicators in use) and particularly Research Question 3 (locating and interpreting the most salient

policy-practice gaps), by epressively offering a granular understanding of where and how the divergence occurs. Central to this analysis, the SPO framework will obviously serve as the analytical lens to systematically deconstruct the policy prescriptions largely embedded in three globally recognized global frameworks, comparing them against actual institutional practice.

To notably apply this analytical lens, this review will broadly deconstruct the policy prescriptions thoroughly embedded in three globally recognized policy frameworks, whose limitations in widely providing adaptable indicators contribute significantly to the policy-practice gap this study comprehensively aims to address. The European Association for Quality Assurance in Higher Education (ENQA, 2023) greatly articulates internal and external quality assurance standards for micro-credentials throughout Europe. The Organisation for Economic Co-operation and Development (OECD, 2021) largely delineates the conditions of value, trust, and mutual recognition that micro-credentials must satisfy. UNESCO (2022) considerably moves forward the principles of stackability, learner portability, and social inclusion. All three instruments converge on four core imperatives: a common definition of credit, transparent assessment procedures, portable mechanisms of recognition, and systematic monitoring of outcomes. However, none of them provide a pragmatic, adaptable set of indicators that can be operationalized in low- and middle-income contexts. This omission lies at the heart of the policy–practice gap that this study seeks to illuminate and address.

2. Methodology

The present investigation adopts the scoping-review protocol originally formulated by Arksey and O'Malley (2005) and subsequently refined by Levac, Colquhoun and O'Brien (2010). Reporting conforms to the PRISMA-ScR checklist (Tricco et al., 2018), thereby ensuring transparency and reproducibility. This design was selected because the domain under study is conceptually fragmented, quality-indicator definitions are heterogeneous, and the evidence base spans peer-reviewed scholarship, policy documentation, and grey literature. The operationalization of this protocol commenced with the definition of precise eligibility criteria. Population: higher-education institutions, national higher-education systems, and providers of modular courses or micro-credentials. Concept: explicit quality indicators, monitoring tools, performance dashboards, and quality-assurance metrics pertinent to credit-based modular education. Context: policy documents, empirical journal articles, and grey-literature sources such as quality-assurance agency reports and accreditation manuals. Inclusion is limited to English-language publications dated 2010–2024. Electronic databases searched comprised Scopus, Web of Science, ERIC, and the OECD iLibrary. Complementary grey-literature repositories included ENQA, UNESCO, the European Commission, and national quality-assurance agency archives. The search strategy utilized a Boolean string combining two main conceptual blocks: (1) micro-credentials and modular education ("micro-credential*" OR "modular education"), and (2) terms denoting quality measurement ("quality indicator*" OR "monitoring" OR "quality assurance"). Screening proceeded in two sequential phases. First, titles and abstracts were examined for relevance; second, full texts of potentially eligible records underwent a comprehensive eligibility assessment. Two reviewers screened each record independently, resolving disagreements through deliberation. Records were excluded if they (i) addressed non-credit courses, (ii) pertained to K-12 education, or (iii) constituted opinion pieces lacking concrete indicators, as these fell outside the scope of credit-based higher education quality indicators. A structured extraction form captured the following attributes for each indicator: (i) name, (ii) operational definition, (iii) SPO classification (Structural, Process, Outcome), (iv) level of application (system, institution, programme), (v) data source, and (vi) evidence type (empirical or policy-normative). Three complementary analytic techniques were applied. Thematic mapping clustered indicators within the three SPO domains, elucidating the conceptual architecture of quality measurement. Frequency analysis remarkably quantified the prevalence of each indicator type, especially revealing dominant measurement foci. Finally, a policy-practice alignment matrix juxtaposed policy-mandated indicators with those actually measured by institutions, thereby operationalising the research questions: RQ1 (mapping of indicators), RQ2 (assessment of policy alignment), and RQ3 (identification of gaps between policy prescriptions and practice).

3. Results

Overview of Included Evidence. The final sample comprised 127 distinct sources: 70 peer-reviewed journal

articles (55 %), 42 policy documents or official frameworks (33 %), and 15 pieces of grey literature (12 %). Geographically, the corpus is skewed toward the Global North: Europe accounts for 46 % of the records, Oceania 22 %, North America 20 %, while Asia, Africa and Latin America together contribute only 12 %. This distribution corroborates the observation that research on quality assurance for micro-credentials and modular programmes remains concentrated in Bologna-aligned jurisdictions (EUA, 2020; OECD, 2021; UNESCO, 2022), suggesting potential limitations in the global applicability of current quality assurance models.

Volume and Typology of Extracted Indicators. From the 127 documents, 214 unique quality indicators were identified after harmonising duplicates. Classification according to the Structure–Process–Outcome (SPO) framework (Donabedian, 1988; OECD, 2019) yielded the following distribution: 70 structural indicators (32.7 %), 85 process indicators (39.7 %), and 59 outcome indicators (27.6 %). The supremacy of process-oriented metrics accentuates particularly a disciplinary bias toward monitoring routine activities, while outcome- and equity-focused measures remain comparatively under-developed (OECD, 2021; Wheelahan & Moodie, 2021). The subsequent sections immensely delve into each of these indicator categories, particularly beginning with a detailed examination of structural indicators.

Structural Indicators. The Policy-Infrastructure Discrepancy. Despite the observed predominance of process-oriented metrics, structural indicators play a crucial role, particularly in the normative aspects of quality assurance frameworks. Structural indicators dominate the normative side of quality-assurance frameworks, especially within European systems (ENQA, 2018, 2023; European Commission, 2015). The most frequently mandated structural metrics pertain to: (i) formal credit-mapping regulations, (ii) institutional recognition policies, (iii) governance responsibility for modular programmes, and (iv) alignment with national qualification frameworks. In contrast, fewer than 28 % of the institutional case studies reported indicators for (a) learning-analytics infrastructure, (b) interoperable student-data systems, and (c) cross-platform credit verification. This discrepancy reveals an infrastructure-policy gap in which regulatory expectations outpace the digital capacities of many providers (EUA, 2020; OECD, 2021).

Process Indicators. Process indicators constitute the largest category (85 indicators). The most commonly tracked items are module-completion rates, student participation, assessment-submission compliance, and credit-conversion accuracy. Nevertheless, alignment between assessment and intended learning outcomes—a cornerstone of the Bologna Process and the ECTS—was explicitly measured in only 41 % of institutional studies, despite its universal inclusion in quality-assurance guidelines (European Commission, 2015; ENQA, 2018). While stakeholder-feedback mechanisms are notably present in 78% of policy texts, their implementation by institutions significantly falls behind, occurring in only 36% of cases. This disparity highlights a gap between formal policy endorsement and actual systematic data collection.

Outcome Indicators. Outcome metrics display the widest divergence between normative prescriptions and institutional practice. While learner attainment (grades, completion) is monitored by 94 % of institutions, longer-term outcomes receive scant attention: graduate employability (31 %), inter-institutional credit-transfer success (18 %), equity dimensions (low-income, rural, gender; 11 %), and lifelong-learning trajectories (9 %). By contrast, these latter dimensions are foregrounded in the OECD (2021), UNESCO (2022) and ENQA (2023) policy agendas. The evidence thus confirms that institutions tend to prioritise short-term academic outputs over the broader social and labour-market outcomes that policy frameworks deem essential.

Sample Quality Indicators by SPO Category

Representative Quality Indicators for Credit-Modular Education

Domain	Indicator	Definition	Level
Structural	Formal credit-recognition policy	Existence of institutional rules for accepting external credits	Institution

Structural	ECTS compliance ratio	% of modules with correct workload-credit alignment	Program
Structural	ICT interoperability	Ability to exchange learner data across platforms	System
Process	Learning outcome alignment index	% of assessments mapped to stated learning outcomes	Program
Process	Credit conversion accuracy	% of converted credits accepted without revalidation	Institution
Process	Stakeholder feedback cycle	Frequency of student/employer feedback review	Program
Outcome	Module completion rate	% of enrolled learners completing each module	Program
Outcome	Graduate employability rate	% employed within 6 months of completion	Institution
Outcome	Credit transfer success rate	% of credits successfully recognized externally	System
Outcome	Equity participation index	Participation of disadvantaged groups	System
Outcome	Lifelong learning re-entry rate	% of learners stacking additional credentials	System

Sources: European Commission (2015), ENQA (2018, 2023), OECD (2021), UNESCO (2022), Wheelahan & Moodie (2021).

Policy–Practice Alignment Matrix. The analysis of indicator alignment across policy directives and institutional practices revealed three distinct zones.

Zone 1 – High Policy / Low Practice Alignment. The indicators in this zone show strong policy requirements yet scientists monitor their deployment in operational settings at a minimal level. These include graduate employability outcomes, equity-based participation metrics, lifelong-learning progression pathways, cross-border credit portability. These indicators appear in 74 % of policy documents but are reflected in fewer than 15 % of institutional dashboards, exposing a pronounced policy–practice gap.

Zone 2 – High Practice / Low Policy Alignment. This zone captures indicators that are widely operationalized by institutions but receive little policy support. Typical examples are: real-time learning-management-system (LMS) participation analytics; cost-per-credit efficiency ratios; teaching-workload optimization metrics. These measures tend to serve managerial or internal efficiency agendas rather than regulatory imperatives.

Zone 3 – High Policy / High Practice Alignment. A set of indicators demonstrates a strong convergence between normative expectations and institutional implementation. They encompass formal credit-recognition rules, module-completion tracking, transparent transcript provision. Both 95 % of policy frameworks and 90 % of institutions reported the systematic use of these metrics, indicating robust alignment.

Synthesis of Alignment Patterns. The policy compliance rate for structural and basic process indicators continues to be high but outcome-focused indicators face ongoing implementation challenges. The

policy focus on equity and lifelong learning metrics does not lead to actual institutional changes. Consequently, institutions tend to prioritize metrics that are technically straightforward to capture rather than those that policy deems most valuable (OECD, 2021; UNESCO, 2022).

4. Discussion

The scoping review reveals that the policy–practice gap in credit-modular education does not stem from a paucity of regulatory frameworks; rather, it is generated by entrenched structural and operational impediments that obstruct comprehensive implementation. Across the 127 sources examined, structural and elementary process indicators exhibit the greatest concordance between policy prescriptions and institutional monitoring.This pattern echoes earlier Bologna-implementation studies, which demonstrate that formal compliance is most robust in domains directly linked to accreditation survival (EUA, 2020; Kehm et al., 2018).

The most important difference between modular education systems appears at the outcome level because it affects student employment prospects and fairness in education and their ability to transfer credits and their academic development throughout their lives. The OECD (2021) and UNESCO (2022) and ENQA (2023) identify these indicators as essential for building trust and recognition in modular education yet institutions maintain their dependence on short academic performance metrics which include module completion rates and internal grades. The research supports Wheelahan and Moodie (2021) who forecast micro-credentials will evolve into bureaucratic tools without social value because of inadequate assessment systems for measuring performance outcomes. Three fundamental elements persistently generate a lasting policy-practice gap between short-term performance metrics and extended outcome evaluation approaches. Data fragmentation – The different systems that handle learner records and labour-market information and institutional analytics function independently from each other.

The absence of integrated data ecosystems precludes real-time measurement of employability, credit-transfer success and lifelong-learning pathways (OECD, 2021). Regulatory fragmentation – Institutions are frequently subject to overlapping mandates from national quality-assurance agencies, professional accreditors and international partners. This multiplicity encourages a "minimum-compliance" stance rather than the design of coherent, mutually reinforcing indicator systems (ENQA, 2018).

Analytical-capacity constraints – Many providers lack skilled data analysts, interoperable platforms and sustainable reporting workflows. Consequently, they gravitate toward indicators that are inexpensive and technically straightforward to capture, rather than those that yield the most policy-relevant insights (EUA, 2020).

Research evidence shows that the policy–practice gap operates as a core organizational problem which appears independently of random events. The problem stems from the current institutional framework which makes it impossible to implement outcome indicators at the policy level.

Implications for Stakeholders

A quality assurance framework needs to be both robust and open to view and fully connected to achieve successful implementation of modular education. Different stakeholder groups need to take specific actions to establish an effective quality assurance system for modular education. Policymakers should move away from exhaustive indicator catalogues and instead adopt a parsimonious core set grounded in the Structure–Process–Outcome (SPO) logic. This core set must satisfy three prerequisite conditions: (i) each indicator must be anchored to a clearly defined operational unit, (ii) it must draw directly on existing data streams, and (iii) its intended decision-use case must be explicitly articulated. Prior to any nationwide implementation, pilot testing with heterogeneous institutional clusters is essential; without empirical feasibility assessments, indicators risk remaining merely symbolic.

While policymakers establish the framework, it is equally critical that higher-education institutions embed modular-quality indicators within their incumbent student-information and learning-analytics infrastructures rather than treating them as parallel reporting mechanisms. Critical actions include the automation of credit-mapping tables, seamless integration of learning-management-system (LMS) data with student records, and the linkage of graduate-tracking modules to national labour-market registries.

Dashboards should be designed to inform internal academic decision-making in addition to satisfying external reporting obligations. Currently, modular credit is often treated as a peripheral curricular element by

oversight bodies. To rectify this, quality-assurance agencies and accreditors, therefore, ought to regard modular credit as an autonomous quality object rather than a peripheral curricular element. Concrete steps entail aligning audit checklists with the SPO framework, harmonising indicator definitions across agencies, and codifying explicit regulations for micro-credential stackability and recognition. Mutual-recognition agreements must reference identical indicator definitions to prevent duplicative compliance burdens.

Ultimately, the success of these systemic reforms hinges on ensuring learners are guaranteed transparent, comparable public information on credit equivalence, module-completion reliability, and labour-market outcomes. A publicly accessible learner portal that visualises SPO indicators would reinforce trust, enhance mobility, and promote informed decision-making across the modular education ecosystem.

Implications for Uzbekistan

Uzbekistan is presently undertaking a comprehensive modernization of its higher-education system, anchored in credit-modular reforms and a sweeping digital transformation. The review evidence directly supports three critical national issues which include credit recognition fragmentation between institutions and insufficient graduate tracking systems and insufficient outcome-based quality assessment methods. Uzbekistan needs to develop a national indicator framework based on Structure–Process–Outcome (SPO) for modular education which should connect student information to employment records and lifelong learning data and ENQA (2023) micro-credential governance principles for domestic accreditation standards. Absent robust, outcome-level indicators, the country risks constructing a system that appears technologically sophisticated yet remains substantively deficient in delivering meaningful, equitable, and traceable modular learning pathways.

Limitations and Future Research

The preponderance of English-language and Global-North literature within this review constrains its applicability to contexts such as Central Asia, Africa, and Latin America, where regional quality-assurance (QA) systems often employ indicator logics that diverge from those catalogued herein. Moreover, the majority of the included studies are cross-sectional, furnishing only tenuous causal insights into the extent to which particular indicators translate into genuine quality improvements. Advancing the field therefore demands a research agenda that (i) implements longitudinal tracking of modular learners to capture dynamic trajectories of achievement and labor-market integration; (ii) conducts quasi-experimental evaluations of indicator deployment to isolate their incremental impact on educational outcomes; (iii) undertakes comparative governance analyses across divergent regulatory regimes to elucidate how institutional contexts shape indicator efficacy; and (iv) produces in-depth institutional case studies that map the passage of indicators from policy formulation through information-system integration to routine managerial practice.

5. Conclusion

This scoping review, drawing upon 214 quality indicators extracted from 127 international sources, exposes a structurally entrenched policy-practice disjunction within credit-modular education. Although prevailing policy discourses foreground the objectives of employability, equity and lifelong learning, the attendant institutional monitoring regimes remain overwhelmingly preoccupied with short-cycle process and compliance metrics. The three main factors which maintain this gap between data platforms and regulatory requirements and insufficient analytical capabilities exist. The monitoring systems maintain their administrative focus because they do not have functional essential indicators to support educational value. The development of Structure–Process–Outcome (SPO) indicator frameworks needs stakeholder participation to establish trust-based relationships which support credit portability and improve labor market performance. The framework needs to connect with interoperable data systems which function at the same operational level as institutional operational capabilities. The system will achieve its goal of supporting lifelong learning and social mobility through the combined operation of its separate components.

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