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Meso and macro-level impacts from implementing open badges and microcredentials—A scoping review

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Abstract

In this scoping review, we discuss the impacts of open recognition technologies reported in 83 studies, focusing on observed impacts at the meso levels (effects on institutions and groups) and macro levels (effects on society). We found that open badging/microcredentialing practices can improve student engagement, facilitate shifts in faculty and institutional policies and practices, align with employer needs and skills frameworks, and promote stronger communities of practice/learning. Most of the research has been in primary/secondary education, despite the initial promise of open credentialing technology as a democratizing agent of education that could spread the burden of lifelong learning across traditional educational/non-educational entities. Fewer studies considered impacts at the meso-level outside of education, and even fewer discussed findings at the macro level of society. These findings were derived from a review of all articles published in ERIC, Scopus, and Proquest on microcredentials/open badges, screening for effects at the meso and macro levels of impact, since the initiation of open badges in 2012.

Keywords

open badges; microcredentials; badges; open education; open recognition; assessment; feedback

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1 Introduction

In 2012, the Mozilla Foundation created and then released to the development community the Open Badges standard as a new technology to recognize all learning wherever it happens. This same technology, now maintained by 1EdTech, an international consortium, is often referred to as open microcredentials. Since then, other technologies have emerged to support open recognition, including blockcerts, verifiable credentials, and comprehensive learner records. Although these technologies differ in form, they share similar potential, and are largely interoperable through the use of open technical standards to make sharing data easy. All of these technologies make it possible for anyone to recognize learning and codify it in a credential that communicates demonstrated abilities, supporting a broader move towards *open recognition* (see West, 2024). Many scholars and practitioners believe that focusing the feedback and assessment within these technologies could enable a transition to a learner-centered educational paradigm where learners are not only the center of the instruction, but also of feedback and recognition.

However, while many have lauded the potential of these technologies, questions remain about how well that potential has been met. In particular, to address the goal of transitioning society to a more learner-centered paradigm, the impacts will need to go beyond individuals and occur at institutional and societal levels as well. Zawacki-Richter (2009, also Zawacki-Richter & Anderson, 2014; Zawacki-Richter & Bozkurt, 2023) proposed the 3M framework to describe the effects of digital education at micro, meso, and macro levels. West and Cheng (2023) utilized this framework to describe the effects of open microcredentials. Because prior reviews have focused primarily on impacts at the micro levels of education, such as effects on learners or instructors, this project focused on observed impacts at the meso level (institutions and groups), and macro levels (society).

2 Literature review

Open badges were designed to recognize and validate learning in more flexible, learner-centered ways than traditional transcripts or certificates. From their inception in 2012 when Mozilla first created the technology to support badges through the Mozilla Backpack, badges carried a dual purpose: to serve as verified representations of achievement and as motivational tools that guide progress through pathways of learning. Earlier forms of informal recognition included Boy and Girl Scout badges, gamified systems on digital platforms, and corporate certification systems for professional development. These systems shared the idea that earning a badge could unlock new opportunities or represent skill mastery, aligning with stealth assessment principles and mastery-based learning modules that are increasingly valued in education and training (Mozilla Foundation et al., 2012; Shute, 2011). Open badges, open microcredentials, verifiable credentials, and similar options emerged as the next generation of these ideas, combining open technical standards that enabled sharing learner recognition across systems while centering the learner in control of their data, credential, and recognition.

2.1 Policy contexts for open badges and microcredentials

The legitimacy and scalability of open badges are increasingly shaped by national and regional policy environments. Whether badges are treated as credible or viewed as experimental innovations often depends less on their technical design than on how they are taken up with existing education policies. Policy approaches to microcredentials differ widely across regions. In the European Union, coordinated efforts have produced shared definitions, quality principles, and cross-border transferability (Council of the European Union, 2022). Australia and New Zealand have taken a more centralized approach, integrating microcredentials into national

qualification systems and offering clearer pathways for recognition and quality assurance (Australian Government Department of Education, Skills and Employment, 2022; New Zealand Qualifications Authority, 2025; OECD, 2021). The United States and Canada, however, lack a single, unified policy approach with initiatives emerging through workforce or provincial efforts, resulting in uneven adoption and legitimacy (Galindo, 2024b; Micro-Credential Council of Canada, n.d.; OECD, 2023). In parts of the Global South and Asia-Pacific, interest in microcredentials is growing, particularly for workforce development and access, but limited alignment with national qualification frameworks continues to constrain broader impact (UNESCO, 2022). These policy differences help explain why institutional uptake, employer recognition, and societal impact vary so widely across contexts.

2.2 Research aligning open badges with workforce and educational standards

The initial vision of Mozilla Foundation, Peer 2 Peer University, and The MacArthur Foundation (2012) when they founded and funded the open badge specification, was for these badges to be more than a digital sticker—they envisioned a meaningful system of portable, verifiable signals of learning that reflect contemporary educational practices and facilitate pathways to gain competencies and refine skills (Mozilla Foundation et al., 2012). According to this vision, open badges were intended to align in two distinct but related ways:

- System-Level Alignment: These credentials were "open", ensuring that badges were interoperable, portable, and designed to be capable of connecting to broader credentialing ecosystems, depending on implementation choices.
- Learning-Level Alignment: Open badges were expected to authentically represent learning that had occurred, based on verifiable achievements.

System-level alignment was necessary to fulfill Mozilla's broader goals, which included capturing learning pathways, signalling achievement, encouraging participation, supporting innovation and flexibility, enhancing social dimensions of informal learning, and fostering identity, reputation, and community development (Mozilla Foundation et al., 2012). To accomplish these goals, badges had to remain open and decentralized, giving learners control over curating their own learning narratives. This openness was also seen as a way to bridge formal, informal, and non-formal learning environments—challenging the siloed nature of proprietary credentialing systems.

Learning-level alignment, on the other hand, depends on ensuring that badges are meaningful representations of actual learning. To help with achieving this, many badges are aligned with competency frameworks, rubrics, learning outcomes, or job-relevant skills. The inclusion of metadata—such as issuer, criteria, and evidence—provides "proof" of the requirements behind each badge and addresses concerns about rigor and credibility. Without such data, badges risk becoming superficial or meaningless.

At the micro level, alignment is often seen in how badge initiatives reflect personal or course-level goals. For example, Stefaniak and Carey's (2019) case study of three different badging systems found that aligning badge design with academic and workforce goals was essential for learner buy-in. Davis and Singh (2015) reported that high school students valued open badges particularly when they could be used on résumés or job applications. In these cases, alignment with workforce pathways motivated student participation and gave badges tangible value.

In higher education, competency-based education (CBE) programs demonstrate how mastery of specific, measurable competencies, rather than seat time, can be the foundation of learning. Blackburn et al. (2016) highlighted how institutions such as Concordia University Wisconsin, Brandman University, and Colorado State University integrated open badge systems within CBE

frameworks. These initiatives incorporated employer input, personalized learning pathways, and stackable credentials to signify real-world skills. The integration of open badges into CBE models allowed for clear, evidence-based validation of learning achievements that align closely with industry expectations.

2.3 Taxonomy of open badge types

While badges can take many forms, these impacts are often shaped by the badge type, the context in which they are deployed, and how learners perceive their value (Cheng et al. 2018).

It is important to recognize that open badges are not created equal, and there is no one-size-fits-all solution. Cheng et al. (2018) suggested a typology of four badges; however, other authors have suggested additional types of badges. We combine these ideas together into a suggested taxonomy of badge typologies:

- Reward: Badges that reinforce positive responses (Gibson et al. 2015)
- Engaged participation: Badges that represent more than just attendance, where the learner is an engaged participant in an activity or community (Hickey & Chartrand, 2020).
- Skill recognition: Badges that recognize skills attained, typically tied to established skills frameworks and rubrics (Ash, 2012).
- Performance/completion: Badges that recognize completed activities or accomplish–ments (Fanfarelli & McDaniel, 2017).
- Recognition Badges: Badges that acknowledge accomplishments such as for a perfor–mance or completion (Tran et al. 2014).
- Credential badges: Badges that certify rigorous rubrics and qualification standards (e.g., a badge awarded to students demonstrating mastery in paleography after completing extensive analysis as research assistants (Gish-Lieberman et al., 2021).
- Instructional Badges: Badges that function as portable learning platforms (Newby, et al., 2020).
- Community Building: Badges that encourage participation in and contribution to communities of practice by recognizing collaboration, mentorship, leadership, and shared identity (O'Byrne et al., 2015; West, 2022).

Over the past decade, a growing body of research has examined how all of these various types of open badges function in practice, but most of this research has looked at findings focused on their effects on individual learners. Across this literature, four core areas of micro-level impact have emerged:

- Learner engagement and motivation
- Learner identity and personal development
- Increasing access, equity, and economic mobility
- Increasing learner self-regulation

2.4 Learner engagement and motivation

A dominant theme in the open badges literature is the role they may play in enhancing learner engagement and motivation. Various motivational theories provide a framework for

understanding these dynamics, including Latham and Locke's (1991) goal-setting theory, Ryan and Deci's (2018) Self-Determination Theory (SDT), and Elliot's (1999) achievement goal theory.

Like many articles dealing with motivation, studies of open badges yield nuanced results. Abramovich et al. (2013) examined 51 middle school students using an intelligent tutoring system, measuring achievement goal orientation with the Patterns of Adaptive Learning Scales (PALS) and expectancy value items. They found that badges influenced motivation in complex ways: for lower-performing students, badges increased interest and reduced performance-avoidance, but earning more participation badges correlated with negative motivational patterns. For higher-performing students, skill badges were associated with stronger expectations of success. Although Abramovich et al. (2013) framed their findings in terms of expectancy-value and goal orientation theories, their results are also consistent with SDT (Ryan and Deci, 2018), which warns that overreliance on extrinsic rewards, such as participation badges, can undermine learning.

2.5 Identity and personal development

Another reported key impact of open badges relates to identity formation and personal development. In their survey of 1,128 students participating in a co-curricular badging system, Young et al. (2019) found that learners often associated badges with projected professional identity. Many students reported that sharing badges on LinkedIn or in digital portfolios allowed them to signal competencies and achievements to others, helping them frame who they were becoming as professionals. In this sense, badges can serve as both personal markers of pride and external signals of competence (Davis et al., 2015; Young et al., 2019). Moreover, when learners select, organize, and share badges, they can also create narratives about their developing identities and future aspirations (Cheng et al., 2020; Gibson et al., 2016). Because identity develops within cultural and social contexts, badges may provide learners with a way to represent and negotiate how their achievements align with the values and narratives of particular professional, academic, or cultural communities (Gee, 2003; Gibson et al., 2016).

2.6 Access, equity, and economic mobility

Concerns of access, equity, and economic mobility were central to the early version for open badges. Central to this early vision was the desire to increase recognition for learners, especially those from nontraditional educational and employment pathways (Gibson et al., 2016; Grant, 2016). However, empirical evidence has produced mixed results regarding whether these goals have been realized. Several studies highlight both promise and limitation. Davis and Singh (2015), for example, found that students from non-dominant backgrounds in an afterschool program were enthusiastic about earning badges, yet questioned their credibility and usefulness beyond the program itself. Similar tensions appeared in a study by Randall and West (2022), who surveyed principals and assistant principals to gauge perceptions of open badges and microcredentials. Although most respondents viewed these credentials as potentially motivating and valuable for recognizing professional growth, they expressed uncertainty about their legitimacy in the absence of broader policy support or alignment with hiring and advancement processes. Other work suggests that badge outcomes are shaped as much by design and context as by intent. Hakulinen et al. (2015) reported that achievement badges were generally motivating for university students, but their effects varied depending on students' performance levels and whether badges were visible to others. These findings suggest that while badges can enhance motivation and engagement, their effectiveness is shaped by individual learner characteristics and design choices within the learning environment.

2.7 Impacting self-regulation

Another recurring theme in the open badges literature is the importance of badge design in promoting equitable learning experiences by scaffolding participation and supporting individual self-regulation. Denny (2013) examined the impact of virtual achievement badges on student engagement in a university programming course, drawing on log data from over 2,000 students. The authors found that badges encouraged greater participation in optional practice activities, with students who earned badges completing significantly more exercises than those who did not. Importantly, while badges increased short-term engagement, their effect on long-term achievement was less clear, suggesting that the design and integration of badges matter for sustaining motivation and supporting self-regulated learning.

Cucchiara et al. (2014) conducted a case study in a university-level biomedical research course, implementing a badge ecosystem grounded in self-regulated learning principles. They found that badges helped learners plan, monitor, and evaluate their progress—supporting autonomy and metacognition, which are essential for equitable learning outcomes. This study provides strong empirical evidence that thoughtfully designed badges can empower learners to manage their learning journey more effectively, supporting equity through enhanced learner agency.

Together, these studies demonstrate that when badges are carefully designed to scaffold learning, offer transparency, and promote self-regulation, they can support learners who may otherwise struggle. While these studies provide valuable insight into learner experience and motivation, they do not capture the broader institutional and systemic factors that ultimately determine whether open badge initiatives can be adopted, scaled, and sustained. To address these limitations, we now turn to the 3M framework, which expands the lens of analysis to include the meso (institutional) and macro (societal) dimensions of open badge implementation.

3 Evaluating the impacts of open badges with the 3M model

While most of these cited studies have focused on how open badges can potentially impact individual learners, there are other areas where open badges could have an impact, including at the institution level and even the societal level. It is at these larger-than-individual levels where adoption decisions are made—potentially determining whether open badging succeeds or fails as an educational and workforce tool and focusing solely on the individual-level impacts risks missing the broader dynamics that determine whether open badging systems are adopted, scaled, and sustained. To truly understand the role of open badges, we must examine the systemic structures, institutional decisions, and policy environments that shape their implementation. Because of that, in this literature review, we utilize the 3M Framework (Zawacki-Richter, 2009; Zawacki-Richter & Anderson, 2014) to provide a more holistic analysis of how open badges function within Open, Distance, and Digital Education (ODDE) and to identify where future research and action are needed.

The 3M-Framework (Zawacki-Richter, 2009; Zawacki-Richter & Anderson, 2014; Zawacki-Richter & Bozkurt, 2023) offers a structured way to analyze ODDE at three interconnected levels: micro, meso, and macro. This model is similar to other ecosystem approaches for looking at social impacts, such as Bronfenbrenner (1979), who posited that innovations have impacts ranging from microsystems (individuals) to macrosystems (society). By mapping research and decision-making across these levels, the framework brings to light how change is shaped by both bottom-up innovation and top-down influence and how neglecting any level can undermine the potential for meaningful and sustained educational reform.

3.1 Micro level

This level focuses on the individual learner and educator. It includes studies on motivation, engagement, learner identity, teaching strategies, feedback, and the user experience of educational technologies like open badges. Research at this level has traditionally dominated the field, offering granular insight into how people experience ODDE environments.

3.2 Meso level

This level encompasses institutions, programs, and organizational structures. It examines how schools, universities, and training providers make decisions about adopting innovations, including open badges. Topics include leadership support, infrastructure readiness, professional development, costs, quality design, and institutional culture. At this level, open badges move from individual use cases to institutional practice—raising questions about scalability, integration with existing systems, and long-term viability.

3.3 Macro level

This level refers to national and international policy contexts, accreditation standards, global labor market trends, and funding mechanisms. Research at this level explores how broader systems influence the direction and legitimacy of ODDE innovations. For open badges, macro-level considerations include national qualification frameworks, credential recognition policies, and alignment with global standards and policies.

Ultimately, the path to meaningful change in ODDE runs not just through individual learners, but through the meso institutions and macro systems that support or resist innovation.

4 Method

The purpose of this review was to investigate the impacts of open badges/microcredentials at the meso and macro levels, defined above. To address this, we conducted a scoping review of the literature, focused on answering the following review question: What impacts have been observed at the meso and macro levels from implementing open badges/microcredentials? Following is a description of our scoping review methods.

4.1 Literature searching

We searched ERIC, Scopus, and ProQuest using search terms related to meso- and macro-level impacts specifically. We used these databases as the largest and most dominant for education research in English. Following this focus, we used the keyword "microcredential" in the thesaurus of each database, along with the following words in an abstract search: "open badges", institution, university, business, society, and community.

Following is our search string: (DE) = "microcredential" OR (AB) "open badges" + (AB) institution, university, business, society OR community.

We did not limit the search by any time period, seeking the most expansive collection of articles possible. However, because open microcredentials/badges are a relatively new phenomenon, most of the articles were from 2016-2025.

4.2 Literature screening and inclusion

This search yielded 162 peer-reviewed journal articles, which we reduced by applying the following inclusion criteria:

1. The article must discuss open badge/microcredential impacts at the meso or macro level
    a. We defined the meso level as discussing the organization or team as a whole unit, focusing beyond the impacts on individuals. In addition, individual impacts were acceptable if the focus was also on the benefit to the larger group or organization. For example, if employee engagement was discussed as bringing overall productivity benefit to the organization.
    b. We defined the macro level as articles discussing impacts on culture, identity, societal benefits, and national/global interests. These articles were rare.
2. The article must report empirical research (qualitative or quantitative);
3. Articles must be published in English due to the language skills of the research team;
4. Articles must be published in peer-reviewed academic outlets.

Screening was done together by the research team until consistency in definitions were attained and then done individually by a member of the research team, with checking of portions of the coding by another member of the research team.

4.3 Analysis of articles

After screening for these inclusion criteria, we were left with we were left with 83 articles, 81 empirical articles plus two non-empirical sources used only for discussion. We coded each research article using tags and folders in Zotero, an online and open access reference management software tool. We first coded for the type of methodology used in the research: quantitative, qualitative, mixed, or non-empirical (articles that were removed from the findings but retained for discussion/implications about potential new directions). We then coded the different badging systems according to the type of badge that they offered: competency/skills, attendance, identity-formation, and engaged participation. We also coded for what level of the 3M model the impacts were observed: meso, macro, or both—in which case, the impacts should have been significant for both levels. We also coded the articles based on the educational system they serviced: higher education, K-12 (or primary/secondary), industry (professional development or customer training/onboarding), and non-credit higher education. In addition, we coded studies for geographic context based on explicit national or regional information reported in the articles to examine how meso- and macro-level research on open badges is distributed globally over time. Each member of the research team was involved in this process, dividing up the analysis and then meeting weekly to discuss results and recode as necessary based on the discussion.

Finally, we coded for the impacts observed by the researchers. These codes were developed inductively, through constant comparison with what we had previously coded, and codes were merged or divided as needed and through discussion of the research team. We finished with the following codes on impact:

1. Positive impact (Identity; Engagement; Marketing; Alignment; Access (increased); Connection/community development; Skilled workforce/workforce readiness; Equity, or fair access to learning and development; Economic Mobility, or badges impacting upward mobility, including new careers and jobs; Policy, or badges that impact policy or help to create policy; Standardization, or badges that create a standard for doing a process or performance within an organization; and Geographic Context
2. Negative impacts (Barriers to adopting badges)

After coding the 81 articles, we reviewed as a team our codes to consider patterns among the observed impacts, which resulted in the key sections of findings discussed next in this article. Following is a diagram of our review process.

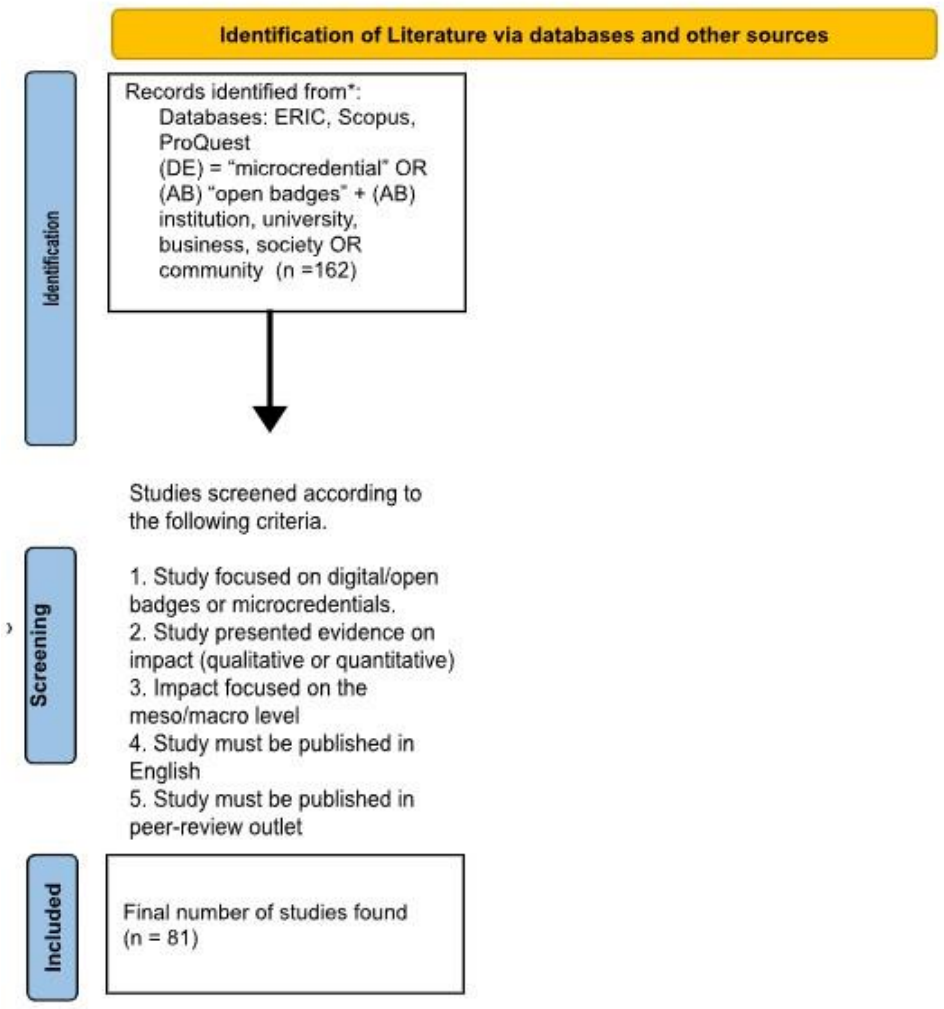

Figure 1. PRISMA (Page et al., 2021) Flowchart.

4.4 Limitations

A major limitation of this review is that we limited our research to articles published in English, in English databases. Another limitation was the difficulty in fully defining meso and macro-level impacts with sufficient precision for screening purposes. For example, if a study found that open badges affected teachers' pedagogy, leading to more student-centered methods that increased motivation, was that an impact on individuals or the institutional strategy? We chose a more liberal interpretation in these situations, but this poses a limitation to the findings.

5 Findings

In the pool of retrieved articles, we identified the majority as either qualitative (38) or mixed methods (25). This distribution suggests that the field of research on open badges is focused on

exploratory understanding and contextual analysis, at least at the meso and macro levels, as there are fewer quantitative studies to determine more predictive certainty.

Table 1: Summary of study types

Study Type	n
Qualitative	38
Mixed Methods	25
Quantitative	18
Total	81

To better understand the scope of the literature, we examined where and when the research was conducted. Table 2 presents the distribution of studies by publication period and geographic context, revealing clear patterns in how the research has developed over time.

Table 2: Regional Distribution of Studies by Publication Period

Publication Period	**North America**	**Europe**	**Asia**	**Oceania**	**Africa**	**Cross-continental**
2016-2018	9	5	1	0	0	1
2019-2020	11	5	3	1	0	0
2021-2022	8	2	2	1	0	0
2023-2025	15	4	4	5	2	2
Total	43	16	10	7	2	3

Note. Counts reflect empirical studies only. Each study was assigned to a single primary region based on the dominant context of analysis. European studies include both national and EU-level contexts. Cross-continental studies were explicitly designed to span multiple regions or countries.

As shown in Table 2, studies are heavily concentrated in North American contexts across all publication periods. Regionally specific international research appears more visible in recent years, with European studies appearing most consistently over time, alongside emerging contributions from Asia and Oceania. In contrast, research in African contexts and cross-continental studies remains scarce and confined to the most recent publication period.

In our findings, we will report the main thematic clusters that we identified through our coding process, discussing the impacts observed in the research on how open badges/microcredentials impact meso and macro levels of education and society.

5.1 Badges can encourage engagement

A main theme in the literature is that the use of open badges may encourage engagement, not just at a micro level, but in ways that can spread and affect meso-level community, culture, and class participation. These impacts fell into three broad themes: engagement as a catalyst for broader participation and diffusion, faculty and institutional shifts, and increased recognition, visibility, and ecosystem change.

5.1.1 Badge-driven engagement and institutional change

Across multiple studies, initial engagement with digital badges led to broader participation within programs and professional communities. Colón Robles et al. (2017), for example, examined a NASA pilot program that introduced STEM badges for educators and middle school students and found that teacher engagement was central to the program's spread. Educators who initially piloted the badges viewed them as a meaningful use of time and a valuable form of professional growth, and they shared their positive experiences and outcomes with their colleagues, which contributed to wider adoption. In one case, a teacher integrated badge activities in her own classroom and then invited the NASA educator to train other teachers ahead of launching an afterschool badge program. Other teachers adapted the activities across grade levels or translated them into Spanish, further extending the program's reach. Similar diffusion effects have been reported in higher education and teacher professional development contexts, where badge participation was associated with increased persistence, reflective practice, and broader program engagement (Delello et al., 2018; Lopez & Younge, 2021; Yıldırım et al., 2016).

In faculty professional development settings, badge-driven engagement also translated into more sustained institutional shifts. McCullough and Buch (2020) found that introducing badges into faculty development led to notable increases in participation, particularly among adjunct and part-time faculty who viewed the credentials as meaningful recognition that strengthened their teaching portfolios and hiring prospects. Since the project launched in 2018, participation reached record levels, with 169 faculty engaging in the initiative and 70 earning completion certificates, making it one of the most successful efforts offered by their university's Center for Teaching and Learning (CTL). Increased participation led to higher attendance at workshops and deeper engagement with teaching improvement efforts, as well as greater satisfaction among CTL staff due to sustained faculty involvement. Related studies similarly documented how badge implementation prompted instructors to revisit learning outcomes, improve curricular transparency, and refine assessment practices in more student-centered and participatory ways (Goulding et al., 2024; Risquez et al., 2020). In co-curricular and partnership-based contexts, badges also supported expanded faculty engagement and more intentional structuring of skill-building opportunities beyond the classroom (Ippoliti & Baeza, 2017). These examples all together suggest that badge-driven engagement can move beyond individual participation to shape teaching practices, professional communities, and institutional cultures.

5.1.2 Institutional recognition and learner visibility

When learners engage meaningfully with badges, those experiences can reshape how learning is recognized and made visible within institutions. Beyond motivating individual learners, badges can influence how achievements are documented, interpreted, and valued across settings. Cheng et al. (2020) illustrate these dynamics through case studies of students in three online university courses where badges were embedded within structured goal-setting and feedback cycles. Designed with a "circulatory feedback function" (p. 418), the badges allowed students to receive feedback, revise their work, and resubmit until criteria were met. Students reported that this iterative process increased their awareness of learning progress and supported deeper

engagement with course material. As recognition shifted from one-time evaluation toward demonstrated mastery, badges came to signal specific accomplishments aligned with learning goals rather than static grades. In turn, instructors adapted their feedback practices to emphasize improvement and progression, increasing transparency around expectations and outcomes. These shifts suggest that badge-mediated engagement can contribute to broader changes in how learning is recognized, communicated, and valued within institutional settings.

5.2 Badges can spark improvement in pedagogy

In addition to transforming student engagement, open badges can also prompt meaningful changes in teaching practices and institutional approaches to pedagogy. Implementing badges often requires faculty to rethink how learning is assessed, recognized, and even supported, which can open broader conversations about curriculum design, instructional goals, and collaboration. Across the literature, badge adoption is associated with reflective design practices that extend beyond individual courses to influence institutional norms around teaching and learning.

One consistent pedagogical impact of badging is the way the design process itself encourages faculty reflection, with downstream effects on instruction and curriculum. Designing badges requires instructors to articulate clear learning outcomes, determine appropriate evidence of learning, and consider how students might demonstrate progress in authentic ways. Reed et al. (2024) found that when faculty were required to clarify whether badges functioned as assessments, credentials, or both, they engaged more deeply with questions of purpose, audience, and alignment with course and program outcomes. This process also prompted broader conversations about representing both academic and workforce-related competencies. Similarly, Carey and Stefaniak (2018) observed that badge design "forces the alignment of learning objectives and assessments, and it focuses the institution on its goals" (p. 1221).

As faculty engage in this reflective design work, several studies documented broader pedagogical and curricular shifts. Wolfenden et al. (2020) described how badge-based professional learning in a teacher education project in India supported more participatory and iterative instructional approaches that narrowed "the gap between the rhetoric of policy and enacted pedagogy" (p. 113), with formative assessments and reflective practice becoming central features. Comparable patterns of curricular innovation were reported elsewhere, where badge systems supported modular learning structures, flexible pathways, and alternative assessment modules that balanced rigor with sustainability (Donnelly & Maguire, 2020). In culturally specific settings, Abramovich and Wardrip (2020) similarly found that badge-supported curriculum development could align learning activities with learners' values and identities while maintaining clear expectations for progress and recognition.

Beyond individual teaching practices, badge initiatives have also influenced how institutions coordinate around teaching quality and professional development. Several studies describe how badge systems encouraged cross-departmental collaboration, increased visibility for teaching excellence, and supported new forms of structured mentorship. Risquez et al. (2020) provides a clear example of these dynamics through a national initiative in which faculty and staff partnered with Ireland's National Forum to co-design badge criteria. This co-design process fostered shared ownership of pedagogical standards and strengthened collaboration across disciplines through a community of practice model that emphasized professional learning with the capacity to evolve alongside institutional needs (Risquez et al., 2020, p. 26). Similar patterns were reported by Jacobsen et al. (2021), who found that badges embedded in an online graduate supervision program supported reflective practice, interdisciplinary dialogue, and alignment with institutional expectations. In some cases, participants applied insights from the program to redesign supervision structures within their own units. Taken together, these examples show

how badge-driven pedagogical change can extend beyond individual reflection to support more coherent, collaborative, and intentional institutional approaches to teaching and learning.

5.3 Badges can facilitate alignment with skills frameworks

Many institutions are moving toward skills-based alignment where badges do not solely signal participation or mastery, but document transferable skills tied to both institutional curriculum standards as well as workforce frameworks. Research illustrates this trend: universities are mapping badges directly onto course competencies to strengthen internal coherence (Bell et al., 2022), vocational and sector-specific programs are creating badges aligned with workforce pipelines (Cosby et al., 2024), and cross-institution collaborations are intentionally preparing students for workforce transitions (Eirich & Wildesen, 2023; Malone & Mahon, 2023).

5.3.1 Curriculum, standards, and workforce readiness

As institutions increasingly emphasize skills-based approaches, badges are being used not simply to mark participation or completion, but to document transferable skills aligned with curricular standards and workforce expectations. Several studies suggested how badges function as connective signals between academic learning and external skills frameworks. Bell et al. (2022), described how universities have begun mapping badges directly to course competencies as a way to strengthen internal coherence and make learning outcomes more legible beyond the classroom. Iniesto et al. (2022), in their systematic review of 27 studies, emphasized the importance of quality assurance standards for ensuring that microcredentials align with employer-required skills, particularly as institutions respond to rapidly evolving labor markets.

Faculty design practices further suggested how this alignment work unfolds in practice. Reed et al. (2024) found that when instructors were asked to clarify whether badges functioned as assessments, credentials, or both, they shifted their attention beyond traditional assessment concerns toward how credentials would be interpreted by multiple stakeholders. The faculty, in turn, framed design decisions around perceived needs of students and employers. This showed that they felt an expanded sense of responsibility for making learning visible and meaningful beyond the course. At the same time, participants expressed doubts about whether employers and students would recognize or value the badges, highlighting a persistent tension between careful alignment and external uptake. The findings suggest that badge design can push faculty into roles traditionally associated with administration, such as ensuring that credentials are legible and meaningful across institutional and workforce contexts.

Evidence from workforce-oriented studies reinforces the role of badges in translating learning into employer-relevant language. Cosby et al. (2024), in their study of agricultural employers in Australia, found that existing vocational credentials often failed to meet the needs of novice and seasonal workers. Employers instead emphasized the need for flexible, sector-specific training focused on compliance and technical skills, positioning microcredentials as a promising alternative for documenting workforce readiness at multiple levels. Likewise, Raish and Rimland (2016) found that employers prioritized communication, teamwork, and evaluation, yet noted that these competencies were rarely captured by traditional transcripts. While employer awareness of badges remained limited, respondents suggested that credentials capable of making such skills visible could help bridge the gap between academic learning and employer expectations. All of these studies suggest that badges can support alignment across curriculum, standards, and workforce needs, while also revealing ongoing challenges related to interpretation, credibility, and adoption.

5.3.2 From credentials to systems

Rather than standing alone, badges are often embedded within emerging systems that connect institutions, industry partners, and shared recognition frameworks. One pathway through which these systems take shape is sustained partnership between educational institutions and external stakeholders. Malone and Mahon (2023) examined the Centre for Insurance, Risk and Data Analytics Studies (CIRDAS), a collaboration between the insurance industry and the Faculty of Lifelong Learning at Southeast Technological University in Ireland, designed to respond to documented skill gaps in a rapidly changing sector. By combining accredited and unaccredited offerings with flexible entry and exit points, the initiative served 2,100 employees through short-form offerings and enrolled 302 learners in accredited degree programs, with participants reporting high perceived value and relevance. At a more local scale, Eirich and Wildesen (2023) described a partnership between Frostburg State University (FSU) and Garrett County Public Schools in which mentoring-based microcredentials were aligned with district-identified practices. Through structured coaching relationships, these microcredentials supported novice teacher preparation, professional confidence, and leadership pipelines. They suggested that this microcredentialing system linked preparation to practice, which led to retention.

Evidence from other contexts suggests that these partnerships are most effective when they are situated within shared frameworks and supported by standardized infrastructure. Woods and Woods (2023) provided an institutional example of a regional public university embedding several microcredential programs into its graduate offerings. Designed to respond to employer demand for upskilling while also supporting institutional sustainability, the initiative leveraged existing courses and flexible certificate pathways to scale credential offerings with minimal resource costs. Donnelly and Maguire (2020) described how open professional development badges embedded within Ireland's National Professional Development Framework contributed to the emergence of a nationally recognized badging system, grounded in shared definitions, mapped standards, and open-access resources. In a similar vein, Pirkkalainen et al. (2023) identified policy alignment and standardized technological infrastructure as key drivers of scalability, noting that shared standards enable universities and industry to co-create and co-deliver learning opportunities. Commonly, these studies suggest that while local institutional adaptations make credentialing systems workable in practice, coordinated infrastructure and ecosystem-level alignment play a central role in shaping the legitimacy, interoperability, and long-term sustainability of badge initiatives

5.4 Badges can promote connection, community, and identity

Early advocates of open badging envisioned badges as a tool for connecting learners with each other, with mentors, and with community-based learning contexts (Waters, 2013). Across this literature, several concrete illustrations show how badges can support these connective functions, particularly when they are embedded within intentionally designed learning communities.

One of the clearest examples was provided by Jacobsen et al. (2021), who examined an online professional development MOOC for faculty and postdoctoral scholars focused on graduate supervision. In the second iteration of the course, a badge microcredential was introduced to recognize not only completion of the course, but also active participation in asynchronous discussion threads and synchronous online sessions. Survey and interview data suggested that participants perceived the badge as contributing to course structure, persistence, and higher than average completion rates. The authors noted that this badge program helped identify participants who later continued as mentors in the course.

Other studies explored how badges can support community through psychological safety, reflection, and collaborative learning structures. Mashford-Pringle et al. (2023a, 2023b) studied an Indigenous cultural safety microcredential designed for health organizations in Canada, finding that participants viewed the experience as a valuable tool for reflection and dialogue. Similarly, Donnelly and Maguire (2020) described how peer-based badge assessment supported trust and collaboration within professional learning communities, although both studies were limited by small sample sizes and relied on self-reported outcomes.

Beyond participation and safety, several studies suggested that badges may support identity formation and belonging within disciplinary, cultural, and learning communities, particularly when learners are positioned as active contributors rather than passive recipients. Research has shown that including learners in the co-design or assessment of badge systems can strengthen community connection and reshape learner's relationships to learning. For example, Tierney et al. (2024) documented how youth participation in co-designing a volunteer badging system shifted perspectives toward more interactive and community-based models of learning, cautioning "without utilizing a co-design approach, curriculum or educational program products such as digital badges may represent only organizational concerns while overlooking important but subtle aspects of learning and program experiences that are highly valued by youth" (p. 264). Similarly, Randall and West (2022) found that involving learners in the design and assessment of their own experiences leads to substantial benefits at both micro and meso levels. Clements et al. (2020) argued that badges can support professional identity development by indicating more belonging within a discipline, particularly for learners from minoritized groups. Extending this work, Risquez et al. (2020) offered a distinctive view by examining a multi-institute badging initiative in which students acted as co-creators and peer endorsers, emphasizing the development of "personal identities associated with disciplinary and professional communities" (p. 24). Learners reported that peer-based endorsement felt more meaningful than traditional assessment, contributing to sustained engagement which "gave an identity to the course that distinguished it at a national level" (p. 27). In this way, badges fostered not only individual engagement, but also a broader transformation in institutional practices and perceptions of academic legitimacy.

Identity-related impacts have also been observed in culturally specific learning environments. Abramovich and Wardrip (2020) studied a religious afterschool program, where students completed voluntary badge-based "missions" connected to family and community practices. Interview data suggests that badge participation supported identity salience and commitment and program leaders viewed the initiative as successful in strengthening students' sense of belonging.

These several studies suggest that while evidence for community-building through badges remains limited and context-dependent, badge systems may support connection and identity formation when they are intentionally designed to foster participation, co-creation, and recognition within meaningful social contexts.

5.5 Badges can increase equity and access to learning

Open badge technology was initially envisioned as helping to facilitate a more equitable and accessible future for all learners (Mozilla Foundation et al., 2012). We found evidence that badges can contribute to equity, primarily by broadening access and participation in learning and by recognizing and validating forms of knowledge and experience that are often undervalued in traditional education systems.

Several empirical studies found that badges reduce structural barriers to participation through low-cost, modular, and flexible learning pathways, particularly for nontraditional learners.

Anderson and Daugherty (2023) found that industry-aligned badges embedded in community college technical education programs increased enrollment and completion among nontraditional students, by lowering time and financial barriers associated with full degree programs. Similarly, McCullough and Buch (2020) showed that badges in faculty professional development increased engagement specifically among adjunct instructors, who viewed the badges as valuable recognition that strengthened their job prospects. Studies in open distance and community college contexts further suggest that flexible, job-focused badges can expand access for economically disadvantaged, first-generation, and underrepresented learners, supporting more direct pathways to employment (McConville et al., 2021; Raghavan et al., 2025).

Research also suggests that badges may advance equity by validating non-traditional forms of learning. Mashford-Pringle et al. (2023a) examined a public health microcredential co-designed with Indigenous communities in Ontario and found that learners perceived the badge as validating Indigenous ways of knowing and enhancing their credibility within health systems that had previously marginalized these forms of expertise. Learners reported increased confidence and job readiness, alongside institutional shifts related to professional practice. Other studies similarly found that badges helped learners make visible skills developed through caregiving, multilingual communication, and community engagement, supporting identity development and recognition in the labor market (Fennelly-Atkinson & Pakhira, 2024; Galindo, 2024a). These studies, taken together, suggest how badges can serve as tools of empowerment not only by lowering barriers to participation, but also by expanding what counts as legitimate learning.

5.6 Cross-cutting barriers to meso- and macro-level impact

Across the reviewed studies, several recurring barriers limited the extent to which open badges and microcredentials translated from localized success into sustained meso- and macro-level impact. These barriers functioned as systemic constraints shaping adoption, scalability, and legitimacy across institutional and societal contexts.

A primary barrier was limited institutional recognition and legitimacy. Across multiple studies, learners, faculty, and administrators expressed uncertainty about whether badges earned in informal or noncredit settings would be recognized by institutions or valued by employers (Donnelly & Maguire, 2020; Lang & Sharp, 2023; Martin et al., 2020). When badges were perceived as supplemental rather than integrated into policies and frameworks, engagement remained localized and fragile. This lack of formal recognition constrained badges' ability to function as credible indicators across educational and workforce ecosystems.

Closely related were challenges of policy fragmentation and weak alignment with national or sector-level frameworks. Even in regions with growing microcredential initiatives, inconsistent policy and the absence of standards limit credibility (Pirkkalainen et al., 2023; Santally et al., 2024). Without clear agreements regarding quality assurance, stackability, and credit recognition, badge systems often remain within individual institutions, reducing their potential contribution to job market mobility and lifelong learning infrastructures.

Faculty and organizational capacity constraints also limit impact. While interest in badge implementation was high, competing responsibilities, limited time, and insufficient design support made sustained engagement difficult (Carey & Stefaniak, 2018; McCullough & Buch, 2020; Reed et al., 2024). In the absence of focused professional development on badge design and assessment, initiatives risked remaining surface-level rather than prompting pedagogical or organizational change. These constraints also affected scalability, as programs frequently relied on a small number of motivated individuals rather than embedded institutional structures.

Infrastructure and platform limitations further constrained adoption and impact due to inequitable access to affordable, interoperable, and open-source tools. Studies highlighted the challenges related to platform access and system integration (Woods & Woods, 2023; Pirkkalainen et al., 2023). When badge systems remained confined to the institution, learners accumulated credentials with limited visibility beyond the issuing context, weakening claims of transferability and workforce alignment.

Finally, other barriers were identified as tensions between visibility and representation within badge systems. Learners in some studies were hesitant to publicly share badges, particularly when credentials represented formative work rather than finalized accomplishments (Cheng et al., 2020). Related scholarship has noted broader challenges in how open badges are interpreted once made visible beyond their intended context, especially when audiences lack familiarity with badge criteria or evidence structures (Ahn et al., 2014; Westerberg & West, 2025). These findings highlight the importance of badge systems that support the contextual interpretation and provide learners with control over how and when achievements are displayed.

6 Conclusion

As open badges/microcredentials have grown in popularity, there have been many research studies published on their impacts. However, most of the scholarly discussion has focused on the micro level of impacts on individuals. In this paper, we completed a scoping review of empirical studies published on open badges/microcredentials that discuss impacts at the meso (institution/community) and macro (society) levels.

6.1 Open badging impacts at meso/macro levels

Perhaps not surprising, the largest body of research has been within primary and secondary education, despite the initial promise of open credentialing technology as a democratizing agent of education that could spread the burden of lifelong learning across traditional educational/non-educational entities. In our review of the research, we found many ways that open badges/microcredentials are impacting educational institutions, primarily at the university level. First, there is some evidence they can encourage engagement in learning. While improved engagement is partly a micro-level impact, it clearly also has impacts on the institution at large as increased engagement can improve progress towards recruitment, retention, and financial goals. For example, open badges have been found to be a catalyst for increasing broader participation in learning, acting as a hook into wider participation in a learning community or program, and increasing motivation to participate in workshops, certificate programs, and relearning of material.

Secondly, open badges have been found to facilitate shifts in faculty and institutional practices around education and recognition. Some studies argued open badges could reshape faculty perceptions around feedback and assessment, and engage students and faculty in more mastery-based learning approaches where feedback, revision, and relearning were more common. In addition, implementing open badges could help standardize alignment in education (particularly with skills frameworks).

Thirdly, open badges can promote stronger communities of practice/learning and identity formation. For example, some research such as Yıldırım et al. (2016) found that open badges led to a more goal-oriented learning community that was fundamentally different. However, most of the impacts we found to be at the educational institution (meso) level. Fewer studies considered impacts at the meso-level outside of education, and even fewer articles discuss potential impacts at the macro-level of society.

6.2 Future research: ongoing challenges facing open badging at meso/macro levels

While the research studies documented many positive impacts at the institutional level, several challenges were identified as well, and future research could study how to address these challenges. A common challenge was the lack of institutional recognition of open badges. Many institutions worry, understandably, about how widespread adoption of open badges may affect their traditional funding and accreditation practices, even if evidence may suggest that there could be strong benefits. For example, Lang and Sharp (2023) revealed that many U.S. institutions were slow to adopt badges due to concerns about cost, staffing, and lack of clear ROI.

However, as Martin et al. (2020) wrote, this uncertainty at the institutional level undermines confidence in open badges, and discourages more widespread participation. The lack of institutional buy-in also impacts faculty abilities to implement open badging practices, as one barrier noted in the literature was faculty time constraints and a lack of support for designing badge practices. Indeed, Reed et al. (2024) reported that higher education faculty were unsure how to design badges that would have long-term value for students and questioned how they would be assessed and maintained at scale.

In addition, open badges are often not fully integrated into formal qualification frameworks, and this communicates to faculty and students that the open badges do not represent real or authentic learning. As Tan et al. (2024) argued, without national frameworks supporting stackable or modular credentials, badges often remained peripheral, limiting their formal utility in higher education pathways. Lang and Sharp (2023) found that even among institutions adopting badges, many lacked clear policies for credit transfer or integration into degree programs, reducing their impact on long-term educational attainment.

Also, there can be unequal access to the necessary technological infrastructure, especially with free or cheaper options for open badging (such as the original open source alternative, Badgr, which was bought by Instructure). This creates barriers for faculty interested in using open badges in their classes if their institution has not purchased access to a formal tool. Despite the openness of the technical standards of open badging and verifiable credentials, there currently is a lack of openly available/open-sourced tools, which impedes some experimentation with these practices at meso and micro levels. As McGreal et al. (2022) pointed out, these infrastructure barriers are especially challenging in rural and low-income areas.

Finally, there remains at the macro level of society, a lack of employer recognition and awareness of open badges. Santally et al. (2024) found that while education providers were optimistic about badges, industry leaders were more hesitant, citing a lack of standardization and uncertainty about credibility. Similarly, Alasmari (2024) noted that although badges were being issued in vocational training, there was still limited recognition by employers in the job market, particularly in regions where formal degrees remain the default. Indeed, Ávila et al. (2024) noted this disconnect between what institutions issued and what employers valued and emphasized the need for universities to actively engage employers in badge design and validation.

6.3 Recommendations: change the metaphors and grow the partnerships

Despite some positive impacts, the lack of institutional buy-in to support open badging can trickle down and impact faculty and student motivation for open badges. One potential solution may be in how open badges are communicated within institutions, and this can be affected by the naming conventions used. For example, if these learner recognition vehicles are called *microcredentials*, they may indicate a competing system to traditional credentials, grades, and degrees. If these are called *open badges*, they may cause institutional leaders to think the

recognition is gamified, informal, and for children and not serious students (similar to Boy/Girl Scout badges).

However, we believe there is another mental model that better explains how the benefits of open badges can be communicated to institutions and other meso-level entities, and that is using the paradigm of *micro-references*. The practice of seeking, and providing, letters of recommendation is well established. Letters of recommendation are on official company/university letterhead, signed by an individual faculty or supervisor, and recognize a learner's accomplishments working for that faculty member or supervisor. A letter of recommendation does not connote anything that would replace formal degrees or credentials, and are not usually audited by the institution.

Similarly, we believe if open badges are communicated as micro-references, this could communicate to institutions that they do not need to accredit, govern, or manage these open badges, but rather grant individuals permission to use institutional branding to write references about learners' performance—encapsulated in badges with narrative descriptions of their performance. Indeed, these micro-references would be more useful for faculty/supervisors and learners as they could be issued at the moment of a quality performance or outcome, and thus not need to be requested later on, after memory of the event fades.

In addition to exploring new metaphors and mental models for open badging, a second major recommendation from our research is that partnerships between industry and education are needed to truly create the impact at the macro level that was envisioned in the original call for open badging. A brilliant example of this potential is the partnership, begun in 2017, between Northeastern University and IBM that allowed individuals with IBM-issued microcredentials to receive credit towards Northeastern degrees (Leaser et al., 2020). Leaser et al. (2020, p. 49) concluded, "The future higher education landscape will demand greater integration between industry-based learning and postsecondary credentials," a future that could yield some of the promised benefits at the macro level that currently eludes open badging systems.

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Author's Contribution (CRediT)

AH; REW; TW: project conceptualization, data curation, formal analysis, writing-original manuscript and writing-reviewing and editing. All authors have read and agreed to the published version of the manuscript.

Data Availability

Data available upon request.

Ethics and Consent

This study collected no original data and used previously published materials, so no consent was sought.

Competing Interests

The authors declare no competing interest.

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