Bridging the Instructional Gap: A Competency-Based Framework for Faculty Professional Development in Higher Education

Jan Tucker, PhD | Columbia Southern University, Orange Beach, Alabama, USA
Pat Neely, EdD | American College of Education, Indianapolis, IN USA

Contact: Jan.tucker@columbiasouthern.edu

Abstract

Competency-based education (CBE) is reshaping curriculum design and delivery in higher education. However, many institutions adopt CBE models without adequately equipping faculty with the instructional design tools necessary for effective implementation. Faculty readiness is critical to program sustainability; without systematic development, institutions risk misalignment among competencies, assessments, and instructional practices, compromising both instructional quality and student outcomes. A scalable, evidence-informed professional development framework integrates backward design, learning analytics, and digital micro-credentials. This model aligns competencies, assessments, and instructional strategies, drawing on recent research, practical insights, and experience in developing AI-supported CBE curricula. It emphasizes instructional coherence, faculty readiness, and long-term sustainability by combining structured recognition of faculty learning with actionable data for continuous improvement. The framework provides a replicable model that institutions can adopt at both the practice and policy levels to strengthen faculty capacity and enhance responsiveness to evolving workforce demands.

Keywords: *competency-based education, faculty development, backward design, micro-credentials, learning analytics, instructional coherence*

Introduction/Background

The growing adoption of competency-based education (CBE) in higher education reflects demand for programs that are both personalized and aligned with labor market needs. With more than 1,000 university programs now offering competency-based formats (Erickson, 2023), CBE allows students to progress by demonstrating mastery through authentic assessments rather than accumulating credit hours. This model particularly benefits nontraditional learners, such as working adults and military-affiliated students, who need flexible, outcome-driven programs that directly connect to workplace skills. CBE programs disproportionately serve adult and career-oriented learners; faculty development in these contexts must account for principles of adult learning, including autonomy, relevance, and applied mastery.

Early adopters such as Western Governors University (WGU) and Southern New Hampshire University (SNHU) illustrate the potential of CBE to prepare students for professional environments through measurable competencies and personalized pacing (Butin, 2014; Lewis et al., 2022). WGU currently enrolls over 180,000 students nationwide, including 169,379 in 2023, making it the largest competency-based university in the United States (Annual report, 2023). Similarly, SNHU serves over 200,000 learners globally, with nearly 187,000 engaged in distance education programs and approximately 2,400 in competency-based education (Southern, 2025). Their success demonstrates how CBE can bridge the gap between education and employment at a time when industries increasingly prioritize competencies such as problem-solving, communication, and applied technical expertise over traditional degrees (Erickson, 2023).

Despite these advantages, many institutions struggle with implementation because they underestimate the instructional and role-based shifts required of faculty. Faculty often enter CBE settings with professional preparation rooted in time-based, lecture-oriented instructional models (Atkinson et al., 2024). Similar challenges have been documented in larger-scale efforts such as the University of Wisconsin's Flexible Option and Northern Arizona University's Personalized Learning programs. In each case, limited faculty preparation led to assessments that mirrored traditional quizzes, inconsistent competency mapping, and even reversion to conventional grading practices, which weakened program fidelity and student confidence (Newlane Annual Report, 2022; Kelchen, 2015; Fain, 2014). By contrast, Western Governors University (WGU) attributes its success to a structured faculty support system that includes targeted onboarding, specialized instructional roles, and continuous professional development in competency-based assessment design (Merisotis, 2024).

Instructional coherence, defined as the alignment of competencies, assessments, and instructional strategies (Marion et al., 2020), is central to high-quality CBE. To achieve this coherence, faculty need targeted preparation in three areas: backward design, which prioritizes defining competencies and assessments before selecting instructional methods (Wiggins & McTighe, 2005); learning analytics, which provide real-time data to inform instructional adjustments (Lurie & Garrett, 2017); and micro-credentialing, which documents faculty mastery of CBE-specific instructional skills and reinforces institutional quality standards (Brown, 2019; Galindo, 2024). A faculty development framework is proposed that integrates backward design, learning analytics, and micro-credentialing into a scalable model. The framework is designed to strengthen

instructional coherence, enhance faculty readiness, and improve learner outcomes in competency-based programs.

Literature Review

Competency-Based Education in Context

Competency-based education (CBE) shifts the emphasis from seat time to demonstrable mastery of well-defined competencies through authentic learning experiences (Winget & Persky, 2022). Students advance at their own pace, demonstrating proficiency through structured assessments such as portfolios, simulations, performance tasks, and applied projects tied directly to professional practice. This flexibility particularly benefits nontraditional learners, including working adults and military-affiliated students, who need personalized, skills-aligned pathways to earn credentials (Janio, 2025). Seasoned professionals may also accelerate completion by earning credit for prior learning, reducing both time and cost.

Institutions adopting CBE at scale report improved retention and engagement by tailoring instruction to workforce competencies, thereby strengthening alignment with employer expectations (Hossler & James, 2021; Lewis et al., 2022; O'Sullivan, 2024). For example, Cyprus College found that competency-focused workshops significantly improved students' critical thinking, collaboration, communication, and creativity, illustrating the power of experiential, competency-aligned learning (Competency, 2025a). These findings demonstrate that when students can see how skills connect to real-world practices, they are more likely to remain committed and succeed, which aligns with broader research showing that applied, workforce-relevant learning increases both persistence and retention (Modern Campus, 2024).

Western Governors University's (WGU) direct assessment model illustrates how mastery-based progression can be scaled effectively. By eliminating seat-time requirements and adopting a disaggregated faculty model that separates instructional, evaluative, and mentoring roles, WGU enables students to complete bachelor's degrees in an average of 2.5 years, compared to the national average of 5.1 years (Hansen, 2024). In contrast, the University of Wisconsin's Flexible Option and Northern Arizona University's Personalized Learning programs expanded access and flexibility but encountered uneven implementation. Early evaluations found that insufficient faculty preparation led to confusion over competency definitions, inconsistent assessment standards, and varied student experiences (Kelchen, 2015; Fain, 2014). These comparisons highlight a critical lesson: innovative delivery structures alone are insufficient. Sustaining CBE quality depends on systematic investment in faculty training, since well-prepared instructors ensure alignment among competencies, assessments, and instruction, while underprepared faculty often revert to traditional methods that undermine CBE integrity.

The Faculty Development Gap

Despite the rapid expansion of competency-based education, faculty preparation remains uneven and frequently underdeveloped. The transition from time-based instruction to mastery-based progression requires more than curricular redesign; it demands a substantive shift in instructional

identity, assessment philosophy, and professional practice. Faculty accustomed to semester-driven delivery models must reconceptualize their roles from primary content transmitters to facilitators of individualized learning pathways and evaluators of demonstrated competency (Echols et al., 2018). Such transformation requires expertise in authentic assessment design, mastery threshold calibration, adaptive feedback, and alignment across competencies and learning experiences, areas that are typically not emphasized in traditional doctoral preparation or institutional onboarding processes (O'Sullivan, 2024).

Research on faculty role transition in innovative instructional models suggests that such shifts are often accompanied by uncertainty, resistance, and variability in implementation fidelity (Henderson et al., 2010; Luft et al., 2004; O'Sullivan, 2024). Studies of online education adoption and alternative delivery models demonstrate that faculty members frequently default to familiar pedagogical routines when confronted with structural change, particularly when professional development is episodic or insufficiently contextualized (Webster-Wright, 2009). In competency-based environments, this tendency can manifest in the reintroduction of time-based assessments, inconsistent interpretation of competency standards, or reliance on traditional grading schemas that undermine mastery principles. These patterns suggest that structural innovation alone does not ensure instructional coherence; faculty capacity must evolve concurrently with program design.

Although higher education institutions have developed scalable professional development infrastructures (particularly for online instruction), these initiatives often emphasize general instructional design principles rather than the distinctive epistemological and assessment demands of CBE. Generic online teaching certifications may address course organization, discussion facilitation, or technology navigation, but they rarely provide systematic training in competency mapping, assessment validation, or data-informed mastery tracking. As a result, faculty may complete professional development programs without acquiring the specialized skills needed to sustain competency-based fidelity. The literature on effective professional learning underscores that transformative change requires sustained engagement, collaborative design work, and iterative feedback cycles rather than discrete workshop participation (Webster-Wright, 2009).

A further dimension of the faculty development gap concerns technological proficiency and data literacy. Competency-based programs rely heavily on learning management systems that support modular design, progress visualization, and analytics-informed interventions. However, research indicates that while faculty attitudes toward educational technology are generally positive, confidence in interpreting advanced analytics and using adaptive systems remains limited (Mitchell et al., 2020). Without structured training that integrates instructional design theory with data-informed practice, faculty may underutilize analytics dashboards or fail to translate performance metrics into actionable instructional adjustments. The result is a disconnect between available technological infrastructure and effective pedagogical application.

Collectively, the literature reveals a consistent pattern: institutions adopt competency-based structures more rapidly than they cultivate faculty expertise to sustain them. Faculty unprepared for CBE implementation frequently revert to conventional instructional practices, generating

variability in assessment rigor and learner experience. Such inconsistencies risk diminishing employer confidence in competency claims and weakening the credibility of CBE credentials. Effective scaling, therefore, depends not solely on curricular architecture but on systematic, theory-informed professional development that builds capacity in assessment literacy, adaptive instruction, and technology integration (Prokes, 2021). The persistence of fragmented, generic, or episodic training approaches underscores the need for an integrated faculty development model specifically designed for competency-based contexts. It is this structural and conceptual gap that the present framework seeks to address.

Professional Development Best Practices

Communities of Practice (CoP) and structured peer-coaching networks allow faculty to share strategies and collaboratively refine instructional design. For example, the Royal College of Physicians and Surgeons of Canada implemented competency-based medical education using a logic model that combined workshops, mentorship, summits, and peer support. This model fostered national consistency while enabling local adaptation in faculty development design (Atkinson et al., 2024). However, many existing professional development programs still lack training in backward design tailored to CBE or mechanisms such as digital micro-credentials to validate faculty learning outcomes. Without these elements, institutions struggle to ensure consistent adoption of competency-aligned instructional frameworks across programs (Anderson et al., 2005; Anis, 2024; Lu, 2010).

Effective professional development embeds learning in authentic teaching contexts and promotes sustained instructional change. Arizona State University's CBE faculty development initiative illustrates this principle by pairing instructors with course design coaches to co-create modules directly aligned with competencies. These collaborations result in redesigned syllabi, improved faculty confidence, and greater instructional consistency (ALI, 2023). Similarly, Purdue Global's Faculty Academy requires participants to demonstrate applied mastery by revising one of their existing courses, with a focus on assessment literacy and digital engagement. This approach ensures that professional development translates immediately into classroom practice (Professional, 2025; Haras, 2018; Webster-Wright, 2009).

Reflective practice cycles also represent the best practice for sustaining change. Structured opportunities to review student outcomes, engage in peer observation, and iteratively revise course content deepen faculty ownership of instructional design improvements. Models such as the Plan-Teach-Reflect-Revise cycle have shown improved instructional coherence and stronger engagement with CBE principles (Thomas et al., 2024). These examples highlight that professional development is most effective when it is continuous, contextualized, and evidence-based, functioning as an embedded process rather than a one-time requirement at course launch.

Micro-credentials and Learning Analytics

Digital micro-credentials, such as badges and certificates, have emerged as strategic tools in higher education by offering targeted, stackable recognition of faculty learning that aligns with institutional objectives. Unlike one-time workshops, micro-credentials validate discrete

competencies in short-term modules and provide formal acknowledgment of skill development. Woods and Woods (2021) emphasize that these credentials certify specific instructional competencies and are rooted in the Open Educational Resources movement, now recognized globally by UNESCO (Gamage & Dehideniya, 2025). Their adoption has expanded rapidly; for example, the Association to Advance Collegiate Schools of Business (AACSB) highlights how institutions worldwide embed micro-credentials into degree programs to align education with industry-relevant skills, which is an approach directly transferable to faculty development (Coursera, 2024).

Across the U.S., states are tying micro-credentials to licensure or re-licensure in areas such as literacy and computer science (Galindo, 2024). National platforms such as Digital Promise and the National Education Association (NEA) now host more than 175 faculty-facing micro-credentials covering assessment design, culturally responsive teaching, and data literacy (Micro-credentials, n.d.). For higher education faculty, institutionally aligned micro-credentials serve several functions: they incentivize participation, make instructional improvement visible in promotion and review systems, and create scalable recognition pathways. Teaching and learning centers can therefore construct stackable pathways tied to backward design, assessment literacy, digital instruction, and emerging domains such as AI literacy, data ethics, and technology integration (Orman et al., 2023). In this way, micro-credentials not only motivate faculty but also signal institutional commitment to responsible engagement with evolving educational technologies.

Recent innovations enhance the reach and credibility of micro-credentials. AI-driven professional development platforms can personalize learning pathways by recommending modules based on classroom analytics, peer feedback, or student outcomes. Blockchain-enabled credentialing, piloted by institutions such as MIT and the University of Melbourne, ensures that digital badges are portable and verifiable, while interoperability initiatives like Credential Engine and Open Badge 3.0 expand recognition across institutions (Brown et al., 2021). These developments enhance portability and verification, strengthening the credibility of micro-credentials within academic ecosystems. Concurrently, learning analytics dashboards (LADs) embedded in learning management systems enable faculty to make responsive, data-informed instructional decisions. Coursera's 2024 overview notes that LADs visualize engagement metrics, mastery progress, and predictive alerts, though translating these data into action remains a developing practice. In high-performing CBE models, dashboards allow faculty to track competency milestones, identify students at risk, and adjust pacing or remediation accordingly (Nguyen, 2024). For example, the VISIR-DB system in science and engineering education provides real-time visualization of lab performance, enabling instructors to tailor feedback based on specific competencies (Serrano et al., 2025). Similarly, CBE programs employ dashboards to guide advisors in delivering individualized interventions for struggling students (Vemula & Moraes, 2024).

Although LADs have shown stronger effects on engagement and participation than on direct test scores, they enhance metacognitive awareness and enable proactive faculty intervention (Kaliisa et al., 2023). When faculty receive training in interpreting dashboard data within backward design and credentialing processes, analytics become part of a cohesive feedback loop. Micro-

credentials validate faculty mastery of competencies, while learning analytics provide real-time evidence of teaching impact. When combined, they create a powerful professional development ecosystem that strengthens instructional design, supports continuous improvement, and advances the fidelity of CBE implementation.

Why Combine Backward Design, Micro-credentials, and Analytics?

An effective faculty development strategy in competency-based education must reflect the instructional complexity and accountability that define CBE delivery. Although innovative models are emerging, they remain undervalued and underused (Orr & Sonnadara, 2019). Integrating backward design, micro-credentials, and learning analytics creates a coherent framework that prepares faculty to align instruction with institutional goals, learner needs, and program-level outcomes.

Backward design, introduced by Wiggins and McTighe (2005), provides the instructional blueprint. By identifying desired outcomes (competencies) before designing assessments and planning learning activities, faculty ensure coherence between what students are expected to master and how they demonstrate mastery. In CBE, where student progression hinges on evidence of competency, this alignment is not optional but foundational.

Micro-credentials build on this foundation by recognizing faculty mastery of key instructional skills such as authentic assessment design, data-informed instruction, and adaptive feedback. Unlike generic workshops, digital badges and stackable credentials serve multiple purposes: they motivate participation in professional development, provide verifiable evidence of proficiency, and connect directly to institutional pathways for promotion and review (Digital Promise, 2023; Woods & Woods, 2021). Programs at Purdue Global and SUNY illustrate how faculty credentialing tied to evidence-based teaching practices fosters higher engagement and course quality (Bisoux, 2024). These initiatives contribute by embedding professional learning into career advancement systems, reinforcing accountability for instructional excellence, and ensuring that faculty expertise remains aligned with institutional goals. As a result, credentialing not only validates individual competence but also strengthens institutional capacity to sustain high-quality, competency-based education on a scale.

Learning analytics complete the triad by supplying the real-time evidence that faculty need to refine their practice. Dashboards embedded in systems like Canvas or Blackboard visualize student engagement, progression, and mastery, enabling targeted interventions. When faculty receive training in interpreting and applying these data, often integrated into credentialing sequences, they become more agile and responsive instructors (Ifenthaler & Yau, 2020). At institutions such as Western Governors University and the University of Wisconsin–Madison School of Nursing, faculty use analytics dashboards to adjust pacing and provide feedback, resulting in measurable gains in student outcomes (Hanson, 2024).

Together, backward design, micro-credentials, and analytics create a scalable and adaptable ecosystem for faculty development. Backward design provides the plan, micro-credentials ensure professional capacity and recognition, and analytics offer continuous feedback to guide

improvement. Their integration strengthens faculty readiness, sustains instructional coherence, and fosters a culture of transparency, accountability, and continuous improvement in competency-based education. Although prior scholarship has examined CBE implementation, faculty readiness, and micro-credentialing independently, the literature lacks an integrated faculty development model that systematically aligns backward design, learning analytics, and credentialed instructional mastery. The framework proposed in this paper addresses that gap.

Discussion of the Topic, Evidence, and Analysis

The proposed three-part faculty development framework integrates backward design, learning analytics, and micro-credentialing into a coherent model for sustaining instructional fidelity in CBE. Figure 1 illustrates the conceptual framework, highlighting the interdependence among backward design, learning analytics, and micro-credentialing. The three strategies are interdependent rather than sequential, creating an ecosystem of alignment, feedback, and recognition. Table 1 translates the framework into practical strategies for adoption by clarifying how each component operates in practice and offering concrete applications, such as redesigning syllabi, interpreting analytics dashboards, and validating faculty competencies through digital badges. Together, these elements form an integrated approach that moves beyond ad hoc workshops to provide faculty with a structured pathway for mastering the instructional, technological, and evaluative skills required to sustain competency-based education at scale.

Figure 1

Conceptual model of the faculty development framework for competency-based education.
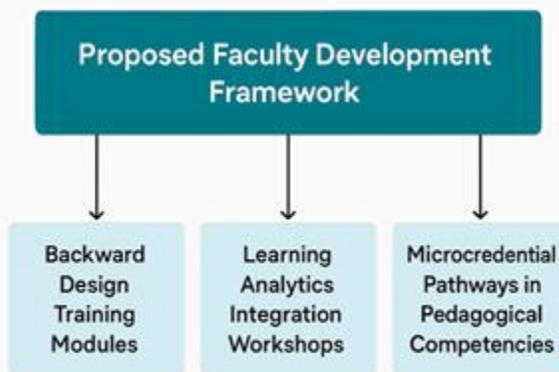
Note. The framework integrates backward design, learning analytics, and micro-credentialing as core elements to ensure instructional coherence and sustainability.

Table 1

Faculty Development Framework for CBE Explained

Component	Description	Example Application
Backward Design Training Modules	Faculty align competencies, assessments, and instructional strategies using a three-stage model: identify desired results, determine evidence, and plan learning experiences.	Redesigning syllabi, case-based workshops, and mapping traditional units into competency-aligned modules.
Learning Analytics Integration Workshops	Faculty trained to interpret LMS dashboards and use data for adaptive instruction and timely intervention.	Canvas Analytics; Blackboard Data; predictive analytics for early intervention; visualization tools for competency mastery.
Micro-credential Pathways in Instructional Competencies	Stackable digital credentials validate faculty mastery in CBE-related skills and support recognition in professional review systems.	Digital Promise badges; SUNY system micro-credentials; faculty ePortfolios for promotion and evaluation.

Note. This table outlines the three components of the proposed framework, with descriptions and examples of application in CBE contexts.

The three-part framework outlined in Figure 1 and Table 1 translates conceptual strategies into practical, faculty-facing interventions. Each component (backward design, learning analytics, and micro-credentialing) addresses a distinct area of instructional readiness while reinforcing the others, creating a coherent professional development system. Backward design ensures that teaching begins with competencies and aligns assessments accordingly. Learning analytics provide real-time evidence to support adaptive instruction. Micro-credentials validate faculty mastery and embed professional learning into institutional recognition systems. These elements, when combined, form an integrated approach that moves beyond ad hoc workshops to provide faculty with a structured pathway for mastering the instructional, technological, and evaluative skills required to sustain competency-based education at scale. Three core components are combined to operationalize the framework: backward-design training modules, learning-analytics integration workshops, and micro-credential pathways. Each element addresses a distinct area of faculty preparation while reinforcing the others.

Part 1: Backward Design Training Modules

Backward design training provides faculty with an instructional blueprint, ensuring alignment of competencies, assessments, and instructional activities (Wiggins & McTighe, 2005). Training

modules include case-based scenarios, and redesign workshops where faculty map existing syllabi onto revised CBE frameworks. For example, instructors rewrite a unit in their course using the three-stage template: (1) identify desired results, (2) determine acceptable evidence, and (3) plan learning experiences. Institutions like Capella University, Brandman, and Texas A&M Commerce have adopted similar instructional design approaches to ensure transparent learning outcomes and programmatic coherence (Competency-based, 2025b; Pearce & Offerman, 2010).

Part 2: Learning Analytics Integration Workshops

Learning analytics workshops complement backward design by equipping faculty with tools to monitor student progress and adapt instruction in real time. Faculty are trained to interpret LMS dashboards (Canvas Analytics, Blackboard Data), set success thresholds, and apply visualization tools for early intervention. For example, Purdue Global uses predictive analytics to help instructors intervene when students fall behind in competency tracks. These practices align with the EDUCAUSE 2023 Teaching and Learning Horizon Report, which emphasizes the increasing role of analytics in higher education decision-making.

Part 3: Micro credential Pathways in Instructional Competencies

Micro-credential pathways validate faculty mastery in CBE-specific competencies such as instructional design, assessment literacy, digital engagement, and culturally responsive instruction. Verified badges from providers such as Digital Promise or the SUNY system allow faculty to showcase expertise in ePortfolios and to use them in promotion and evaluation (Digital Learning Playbook, 2022). These pathways foster a culture of professional growth and instructional excellence while enabling institutions to target the skills most relevant to their CBE initiatives.

Delivery and Scalability

The framework is designed for modular implementation and flexible delivery. Content can be hosted on institutional PD platforms or LMS shells for asynchronous access, while periodic synchronous sessions (faculty roundtables or design studios) promote collaboration and peer learning. Institutions can scale adoption by leveraging faculty champions or regional consortia for shared infrastructure. Asynchronous access ensures scalability across departments, but institutions must balance this with peer dialogue.

Recommendations and Conclusion

Competency-based education requires more than curricular redesign; it demands transformation in faculty roles, assessment practices, and instructional strategies. The framework integrating backward design, learning analytics, and micro-credentialing addresses these challenges by equipping faculty with the tools, evidence, and recognition needed to deliver high-quality, learner-centered instruction. Embedding these strategies into practice and policy enables institutions to build coherent, responsive, and mastery-focused programs. Faculty development must be regarded as the foundation of sustainable program design, ensuring fidelity and

improved outcomes for diverse learners. Institutions that invest in structured, credentialed, and data-informed professional development will be better positioned to respond to evolving workforce demands.

Recommendations for Practice

At the practice level, effective implementation of CBE requires faculty preparation that is both systematic and sustained. Institutions should begin with foundational training in backward design to ensure that faculty can align competencies, assessments, and instructional strategies. Training may be developed in-house or adapted from resources such as Coursera, LinkedIn Learning, Quality Matters, or the Online Learning Consortium. Institutions should also integrate learning analytics tools into professional development. When embedded in learning management systems (e.g., Canvas), analytics not only track faculty engagement with training but also provide actionable insights for instructional improvement, creating a feedback loop in which professional learning and classroom practice reinforce each other.

Faculty engagement can be strengthened through micro-credential pathways tied to promotion and review processes. Digital micro-credentials in areas such as assessment literacy or culturally responsive instruction validate faculty expertise and cultivate a culture of continuous learning. Purdue Global and SUNY demonstrate how recognition systems linked to micro-credentials improve both coherence and instructional quality. Finally, scalable approaches can leverage widely available platforms such as LinkedIn Learning or Coursera to host CBE-specific content. Embedding institutional modules in these environments provides flexible access across hiring cycles, avoids enrollment barriers, and ensures consistency on a scale. Collectively, these practices support instructional coherence, faculty readiness, and program fidelity.

Recommendations for Policy

At the policy level, institutional policy is essential for embedding CBE within sustainable structures. At a minimum, universities should establish baseline requirements for faculty participation in CBE-specific professional development, verified through micro-credentials or training modules. Institutions such as Texas A&M University–Commerce and Capella University have adopted such mandates, reinforcing consistency and accountability across programs.

Policies should also promote cross-functional collaboration across academic affairs, instructional design, IT, and institutional research. The California Community Colleges' Vision Resource Center illustrates how policy-supported collaboration can increase faculty participation and strengthen program quality.

Institutions should require credential portability through frameworks such as Open Badge 3.0 or Credential Engine to ensure recognition and mobility. Faculty should also earn micro-credentials in AI literacy, data ethics, and the responsible use of analytics, reflecting the growing role of technology in instruction. System-level consortia models can pool resources to expand professional development infrastructure, particularly for smaller institutions. Policies should also

link faculty professional development directly to accreditation and quality assurance reviews, ensuring fidelity to CBE principles and accountability to stakeholders.

Future Directions in CBE Faculty Training

Advances in technology, collaboration, and continuous improvement will shape the future of faculty development in competency-based education. Artificial intelligence offers new opportunities to personalize faculty learning by analyzing performance data, student outcomes, and engagement patterns. For example, Georgia State University's Learning Analytics Research Services (LARS) provides data-driven insights into teaching and learning, while Arizona State University's Knowledge Enterprise develops AI-enhanced teaching systems.

Virtual and augmented reality enable immersive, risk-free training environments. AI-driven avatars that represent diverse students needs enable instructors to practice differentiated instruction, feedback, and collaboration strategies. Stanford Medicine's Neurosurgical Simulation and Virtual Reality Center demonstrate how VR can refine facilitation and assessment skills, offering models adaptable to broader CBE contexts.

Cross-institutional collaboration will further expand the reach of faculty development. Blockchain-verified micro-credentials and interoperability standards, such as Open Badge 3.0, will enable faculty to build portable portfolios recognized across institutions. Consortia within systems such as California State University and SUNY illustrate how resource sharing and joint innovation can scale professional learning initiatives.

Finally, predictive analytics and early warning systems will transform faculty development from one-time training into ongoing, data-informed improvement. Continuous monitoring of instructional effectiveness, student satisfaction, and competency attainment will allow institutions to provide targeted support that evolves with faculty practice. This approach mirrors CBE principles by creating adaptive, transparent, and mastery-based ecosystems that sustain instructional quality over time. Faculty development functions as a foundational element of sustainable CBE implementation. Institutions that embed structured, technology-enabled, and collaborative professional learning into their long-term strategy will be best positioned to maintain fidelity, strengthen instructional quality, and deliver equitable, skills-based education to diverse learners.

References

ALI Research Staff (2023). Professional development for teachers: leveraging pd at your school. Accelerate Learning.

Anderson, N.M., Barksdale, M. A., & Hite, C. E. Preservice teachers' observations of cooperating teachers and peers while participating in an early field experience. Teacher Education Quarterly. 2005;32(4):97–117. .

Anis, D. (2024). Teacher professional development in the digital age: addressing the evolving needs post-COVID. International Journal for Multidisciplinary Research. 6. 1–14. https://doi.org/10.36948/ijfmr.2024.v06i01.12386.

Annual report 2023. Western Governors University. (2023, July 15). https://www.wgu.edu/about/annual-report

Arizona State University Knowledge Enterprise. (n.d.). Artificial intelligence in teaching and learning. Retrieved August 2025, from the ASU Knowledge Enterprise website

Atkinson, A. R., Abbott, C., Oswald, A., Boucher, A., Cavalcanti, R. B., Frank, J. R., & Snell, L. S. (2024). Strategies to enable transformation in medical education: faculty and trainee development in competence by design. Perspectives on Medical Education, 13 (1), 85–94.

Bisoux, T. (2024, September 16). Meeting the rising demand for Microlearning. AACSB. https://www.aacsb.edu/insights/articles/2022/07/meeting-the-rising-demand-for-microlearning

Brown, D. (2019). Research and educator micro-credentials. Digital Promise.

Brown, M., Nic Giolla Mhichíl, M., Beirne, E., & Mac Lochlainn, C. (2021). The Global Micro-credential Landscape: Charting a New Credential Ecology for Life-long Learning. http://hdl.handle. .net/ 11599/ 3894

Butin, D. (2014). The course is dead. Long live the course. Insider Higher Education.

CAEL. (2022). About Us: Why We Do It. https://www.cael.org/about-us/why-we-do-it

CBEN (2018, updated). Quality Framework for Competency-Based Education Programs. Widely cited quality standards that double as a training backbone (competency design, assessment quality, data use, roles).

Competency-based education: How to elevate corporate learning. (2025a). Coursera. https://www.coursera.org/enterprise/articles/competency-based-education

Competency-based education: East Texas A&M University, ETAMU. (2025b, August 13). https://www.etamu.edu/competency-based-education/

Coursera. (2024, September 16). How microcredentials are transforming higher education. AACSB. https://www.aacsb.edu/insights/articles/2023/10/how-microcredentials-are-transforming-higher-education

Digital Learning Playbook. Digital Promise. (2022, May 13). https://digitalpromise.org/online-learning/digital-learning-playbook.

Digital Promise. (2023). Interoperable learning records: Advancing educator micro-credentialing through Open Badges 3.0.

Echols, D.G., Neely, P.W., & Dusick, D. (2018). Understanding faculty training in competency-based curriculum development. Journal of Competency-Based Education, 3(2). https://doi.org/10.1002/cbe2.1162.

Educause. (2019). The future of competency-based education: Technology, workforce alignment, and student success.

Educause Horizon Report (2024). Teaching and Learning Edition. EDUCAUSE Library. (2024, May 13).

Erickson, K. (2023). The Future of learning is based on skills. ShiftIQ.

Fain, P. (2014, February 5). Slow start for competency-based education. Inside Higher Ed. https://www.insidehighered.com/news/2014/02/05/competency-based-education-gets-slow-start

Galindo, M. (2024, November 14). Micro-credentials on the rise: National policy map showcases new developments. Digital Promise. https://digitalpromise.org/2024/11/14/micro-credentials-on-the-rise-national-policy-map-showcases-new-developments/

Gamage, K. A. A., & Dehideniya, S. C. P. (2025). Unlocking career potential: how micro-credentials are revolutionising higher education and lifelong learning. Education Sciences, 15(5), 525. https://doi.org/10.3390/educsci15050525

Georgia State University. (2023). AI-enhanced faculty development: Preliminary findings from the adaptive professional learning pilot. Center for Excellence in Teaching and Learning.

Georgia State University, Center for Excellence in Teaching, Learning, and Online Education. (n.d.). Learning Analytics Research Services (LARS). Retrieved August 2025, from the CETLOE website.

Gould, M. (2021). Faculty development in the digital age: Gaps, challenges, and opportunities. Online Journal of Distance Learning Administration, 24(3).

Hansen, J. (2024). Innovating for the Individual: Introducing the 2023 WGU Annual Report.

Hanson, S. (2024, February 6). Everything you need to know about a learning analytics dashboard. Kitaboo. https://kitaboo.com/learning-analytics-dashboard-a-detailed-guide/#:~:text=Learning%20Analytics%20Dashboards%20aim%20to,interventions%20to%20enhance%20learning%20outcomes.

Haras, C. (2018). Faculty development as an authentic professional practice. Higher Education Today.

Henderson C, Finkelstein N, Beach A (2010). Beyond dissemination in college science teaching: an introduction to four core change strategies. *J Coll Sci Teach 39*, 18–25.

Hossler, C., & James, A. E. (2021). Competency-based nursing: Reducing cost while maintaining or improving quality. The Journal of Competency-Based Education, 6(2). https://doi.org/10.1002/cbe2.1247

Ifenthaler, D., & Yau, J. Y.-K. (2020). Utilising learning analytics to support study success in higher education: a systematic review. https://doi.org/doi:10.1007/s11423-020-09788-z

Janio, J. (2025). Competency-based education. FeedbackFruits.

Kaliisa, R., Misiejuk, K., López-Pernas, S., Khalil, M., & Saqr, M. (2023, December 22). Have learning analytics dashboards lived up to the hype? A systematic review of the impact on students' achievement, motivation, participation, and attitude. arXiv.org.

Kelchen, R. (2015). The landscape of competency-based education: Enrollments, demographics, and affordability. AEI Public Policy Report. American Enterprise Institute.

Lewis, L. S., Rebeschi, L. M., & Hunt, E. (2022). Nursing Education Practice Update 2022: Competency-Based Education in Nursing. SAGE Open Nursing, 8, 23779608221140774.

Luft JA, Kurdziel JP, Roehrig GH, Turner J (2004). Growing a garden without water: graduate teaching assistants in introductory science laboratories at a doctoral/research university. *J Res Sci Teach 41*, 211-233.

Lurie, H., & Garrett, R. (2017). Deconstructing competency-based education: An assessment of institutional activity, goals, and challenges in higher education. The Journal of Competency Based Education. 2 (3).

Marion, S., Worthen, M., & Evans, C. (2020). How systems of assessments aligned with competency-based education can support equity. Aurora Institute.

Merisotis, J. (Oct. 10, 2024). Non-degree credentials are great tools, but some need sharpening. Lumina Foundation.

Micro-credentials. Digital Promise. (2025, May 6). https://digitalpromise.org/microcredentials

Mitchell, M., Kwong, T., & Rountree, J. (2020). Exploring faculty readiness for technology integration in competency-based education. Journal of Higher Education Theory and Practice, 20(6), 52–60.

Modern Campus (2024). Shaping Competency-Based Education for Modern Learners. https://moderncampus.com/blog/competency-based-education.

Newlane Annual Report (2022).

Nguyen, N. (2024). How learning analytics can improve student success. Feedback Fruits. https://feedbackfruits.com/blog/leverage-learning-analytics-for-strategic-decisions-and-student-success

Online Learning Consortium. (n.d.). Badges.

Orman, R., Şimşek, E., & Kozak Çakir, M. A. (2023). Micro-credentials and reflections on higher education. Higher Education Evaluation and Development. https://www.emerald.com/insight/content/ doi/10.1108/HEED-08-2022-0028/full/html

Orr, C. & Sonnadara, R. (2019, May 1). Coaching by design: Exploring a new approach to faculty development in competency-based education curriculum. Advances in Medical Education and Practice. 10, 229–244. https://doi.org/10.2147/AMEP.S191470

O'Sullivan, L. (2024). Increasing Faculty Knowledge of Competency-Based Education: A Quality Improvement Project. DNP Scholarly Projects. 92. https://repository.belmont.edu/dnpscholarlyprojects/92

Pearce & Offerman (2010). Capella University: Innovation driven by an outcomes-based institution. Continuing Higher Education review, 74,161-168

Perisic, A., Perisic, I., Lazic, M., & Perisic, B. (2023). The foundation for future education, teaching, training, learning, and performing infrastructure - The open interoperability conceptual framework approach. Heliyon, 9(6), e16836.

Prokes, C. (2021). Faculty views of CBE, self-efficacy, and institutional support: An exploratory study. The Journal of Competency-Based Education, 6(3), e1263.

Professional Development for Educators (2025). Purdue Global University Policy Document. Quality Matters. (n.d.). Higher Ed Teaching Online Certificate.

Schultz, K. W., Kolomitro, K., Koppula, S., & Bethune, C. (2023). Competency-based faculty development: applying lessons from CBME. Canadian Medical Education Journal.

Serrano, V., Cuadros, J., Fernández-Ruano, L. (2025). Learning analytics dashboards for assessing remote labs users' work: a case study with VISIR-DB. Tech Know Learn 30, 263–290 (2025).

Southern New Hampshire University releases spring president's list (2025). https://www.manisteenews.com/news/article/southern-new-hampshire-university-releases-spring-20327017.php

Stanford University School of Medicine. (n.d.). Neurosurgical Simulation and Virtual Reality Center. Retrieved August 2025, from Stanford Medicine website.

Stroo, M., Asfaw, K., Deeter, C., Freel, S. A., Brouwer, R. J. N., Hames, B., & Snyder, D. C. (2020, March 11). Impact of implementing a competency-based job framework for clinical research professionals on employee turnover. Journal of clinical and translational science. https://pmc.ncbi.nlm.nih.gov/articles/PMC7681128

Thomas, C., Koehn, J. & Turner, J. (2024). Promising practices for leadership development: exploring a collaborative professional learning and coaching program. Canadian Journal

of Educational Administration and Policy / Revue canadienne en administration et politique de l'éducation, 204, 88–103.

Vemula, S. R., & Moraes, M. (2024, January 17). Learning analytics dashboards for advisors: A Systematic Literature Review. arXiv.org. https://arxiv.org/abs/2402.01671

Webster-Wright, A. (2009). Reframing professional development through understanding authentic professional learning. Review of Educational Research, 79(2), 702–739.

Wiggins, G., & McTighe, J. (2005). Understanding by design (2nd ed.). Alexandria, VA: Association for Supervision and Curriculum Development.

Winget, M., & Persky, A. M. (2022). A Practical Review of Mastery Learning. American Journal of Pharmaceutical Education, 86(10), ajpe8906.

Woods, K., & Woods, J. A. (2021). Less is more: exploring the value of micro-credentials within a graduate program. The Journal of Continuing Higher Education, 71(2), 215–223.