# From Individual Innovation to Institutional Strategy: A Competency-Based Model for Strategic AI Integration in Faculty Development

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**Abstract**

*The integration of generative artificial intelligence (AI) in higher education requires more than isolated initiatives; it demands a structured institutional model that connects pedagogical innovation, competency-based alignment, and academic validation. Within the framework of Universidad del Valle de Guatemala Institutional AI Adoption Strategy, the Center for Excellence in Teaching and Learning led a collegial process to identify, analyze, validate, and systematize faculty best practices in AI integration. The initiative aimed to strengthen student learning and ensuring coherence with the university's educational model, while integrating AI in their teaching strategies. The initiative was organized into four strategic phases. The first phase, Institutional Mapping of Teaching Practices, identified AI-integrated teaching and assessment practices across disciplines through a targeted faculty survey. A total of 135 practices were collected and organized according to the university's twelve generic competencies. The second phase, Selection and Alignment with Institutional Generic Competencies, involved a rigorous qualitative review and comparative analysis to determine the degree of alignment between reported practices and formal competency definitions. This process refined the initial set of practices and resulted in 25 selected practices with strong potential for institutional adoption. During the third phase, Interfaculty Collegial Validation, faculty from diverse academic departments participated in structured consultation sessions to evaluate clarity, relevance, and reproducibility. This collaborative dialogue strengthened the academic quality and cross-disciplinary viability of the selected practices. Finally, Academic Standardization and Institutional Projection led to the publication of an institutional document compiling validated practices, pedagogical guidelines, and structured levels of AI integration to support faculty development. This experience demonstrates that institutional AI adoption can be addressed through a structured, competency-aligned, and collegial model. It positions faculty as active agents of academic innovation and offers a replicable framework for higher education institutions seeking to integrate AI through a strategic and collaborative approach.*

**Keywords:** *Faculty Development, AI integration, Higher Education*

## 1. Introduction

The rapid integration of generative artificial intelligence (AI) in higher education is reshaping teaching and learning practices across disciplines. While many faculty members are experimenting with AI tools to enhance their courses, these efforts often remain fragmented and disconnected from broader institutional strategies. As a result, universities face the challenge of moving beyond isolated innovations toward structured approaches that ensure pedagogical coherence, alignment with institutional goals, and sustainable faculty development.

In this context, the integration of AI in teaching cannot be reduced to the adoption of technological tools. It requires the design of institutional models that support faculty in developing pedagogically grounded practices, aligned with competency-based education frameworks and validated through collaborative academic processes. However, there is still a limited number of documented experiences that describe how institutions can systematically organize, evaluate, and scale such practices.

This experience addresses this gap by presenting a structured, competency-based institutional model for AI integration in faculty development. The model is based on a collegial process that includes the identification, analysis, validation, and systematization of teaching practices, aligned with institutional generic competencies. Developed within the framework of the University of Valle de Guatemala's AI Adoption Strategy [1], the model offers a replicable approach for higher education institutions seeking to integrate AI in a strategic, collaborative, and pedagogically meaningful way.

## 2. Literature Review

### 2.1. *Artificial Intelligence in Higher Education*

The integration of artificial intelligence (AI) in higher education has expanded significantly in the last decade, positioning itself as a key driver of educational transformation. AI technologies—such as machine learning, learning analytics, and intelligent tutoring systems—enable personalized learning, adaptive feedback, and data-informed decision-making, contributing to more efficient and responsive teaching and learning processes [2] [3].
Research has shown that AI applications in education can be categorized into areas such as assessment, prediction, intelligent tutoring, and learning management, reflecting a broad spectrum of pedagogical uses [2]. These developments have the potential to reshape traditional instructional practices, not only by enhancing access to information but also by transforming how knowledge is constructed, delivered, and evaluated [4]. However, despite its transformative potential, the integration of AI in higher education is not without challenges. Issues related to ethical considerations, data privacy, infrastructure, and the lack of AI literacy among educators continue to limit its effective implementation [2][3]. Additionally, research highlights that while AI adoption is increasing, its pedagogical integration often lacks alignment with instructional design and institutional frameworks, which may reduce its impact on meaningful learning outcomes [4].

### *2.2. Faculty Development in the Context of AI*

Faculty members play a critical role in the successful integration of AI in higher education, as they are key agents in designing, implementing, and mediating AI-enhanced learning experiences. However, current research indicates that faculty perspectives, competencies, and professional development needs in relation to AI remain underexplored [2]. Studies show that while educators recognize the benefits of AI—such as improved instructional efficiency, personalized teaching strategies, and enhanced feedback mechanisms—they also face significant challenges, including limited AI literacy, ethical concerns, and uncertainty about their evolving roles [2][5]. This tension reflects a broader gap between technological advancement and pedagogical readiness.
Moreover, the literature emphasizes that professional development is essential to support faculty in navigating this transformation. Effective faculty development programs should not only focus on technical skills but also address pedagogical integration, ethical considerations, and human–AI collaboration [2]. In this context, AI should be understood as a tool that supports teaching rather than replaces educators, reinforcing the need for structured institutional support systems.

### *2.3. Competency-Based Education and AI*

Competency-based education (CBE) has gained increasing relevance in higher education as an approach that prioritizes the development of measurable skills, progressive mastery, and continuous improvement, rather than traditional time-based models of instruction. This approach emphasizes the alignment between learning outcomes, assessment practices, and the gradual development of competencies that can be transferred to academic and professional contexts [6]. Within this framework, the integration of artificial intelligence (AI) creates new opportunities to strengthen both the design and the monitoring of competency development.
AI tools enable more adaptive, data-informed approaches within competency-based education. They can support personalized learning pathways, automated assessment systems, and real-time tracking of competency development, allowing continuous monitoring of student progress, identification of learning gaps, and provision of targeted feedback. In the context of faculty development, AI has shown strong potential to support competency mapping, adaptive training processes, and micro-credentialing, although its large-scale adoption still faces challenges related to infrastructure, ethical considerations, and methodological limitations [6]. At the same time, recent advances in AI competency frameworks have expanded the understanding of what it means to be “competent” in AI-mediated educational environments. Beyond technical skills, AI competency is increasingly understood as a multidimensional construct that includes critical thinking, ethical awareness, digital agency, and self-regulated learning. International organizations such as UNESCO and the European Commission emphasize the importance of embedding these competencies into curricula, enabling students not only to use AI tools but also to engage with them in informed, reflective, and socially responsible ways [7].
However, despite these advances, existing competency frameworks are often based on conceptual definitions and self-reported measures, with limited attention to empirical evidence derived from real teaching and learning practices. Recent studies highlight a gap between theoretical models of AI literacy and the actual behaviors, strategies, and usage patterns that students develop in authentic educational

contexts [7]. Similarly, research on AI in competency-based education shows that much of the literature focuses on student-centered applications, while the development of faculty competencies and related professional practices remains less explored [6].
This gap highlights the need to complement traditional competency-based approaches with practice-oriented and evidence-based perspectives that better capture how AI is integrated into teaching and learning processes. Understanding competency development not simply as a predefined set of skills, but as a dynamic and context-dependent process shaped through interaction with AI tools, can provide a stronger foundation for designing faculty development models and institutional strategies [7]. In this sense, integrating AI into competency-based education requires not only technological adoption, but also pedagogical alignment and institutional support to ensure meaningful and sustainable implementation [6].

### *2.4. Toward Institutional Models for AI Integration*

Recent literature increasingly highlights the need to move beyond isolated initiatives toward structured institutional approaches for the integration of artificial intelligence in higher education. While many universities have begun to develop guidelines, ethical frameworks, and support resources, these efforts are often fragmented or focused on specific aspects such as policy, tool usage, or academic integrity, rather than articulated as comprehensive and validated models for faculty development and pedagogical integration [2].
In the case of the University of Valle de Guatemala, significant progress has been made in establishing an institutional foundation for the ethical and responsible use of artificial intelligence. This process has been led by the Artificial Intelligence Directorate through the institutional AI Adoption Strategy [1], which has guided the implementation of dedicated working groups, including the Center for Excellence in Learning and Teaching (CEAD), responsible for the integration of AI into teaching.This is reflected in the development of formal guidelines for students and faculty members [8] [9], and a comprehensive Code of Ethics of UVG that emphasize principles such as transparency, equity, data protection, and respect for human dignity [10]. These institutional efforts promote the use of AI as a tool to enhance learning, foster critical thinking, and support responsible decision-making in academic contexts. However, despite this strong normative foundation, a gap remains between these institutional guidelines and their translation into everyday teaching practice. While the policies clearly define what responsible AI use should look like, they do not fully specify how these principles are operationalized in the design of courses, teaching strategies, and assessment practices. This creates a disconnect between institutional intent and pedagogical implementation, highlighting the need for more structured and practice-oriented models that support faculty in integrating AI in a consistent and meaningful way [4]. More broadly, this situation reflects a recurring challenge in higher education: institutional documents often provide a strong ethical and normative foundation, yet they do not always translate into structured, systematic, and empirically validated models that guide how AI should be integrated into teaching practice and faculty development processes. In many cases, the focus remains on defining principles and recommended practices, with less emphasis on how these are operationalized through coordinated processes, collaborative validation, and alignment with competency-based educational frameworks [2]. This reveals an important gap between institutional intention and pedagogical implementation. Although universities recognize the importance of integrating AI in a responsible and meaningful way, there is still a need for models that organize this integration into clear phases, incorporate faculty participation, ensure alignment with institutional competencies, and generate validated and transferable practices. Addressing this gap requires moving from guidelines and ethical frameworks toward structured institutional models that combine strategy, pedagogy, and collaborative processes. Such models should not only define what responsible AI use looks like, but also provide a systematic pathway for identifying, validating, and scaling effective teaching practices. In this context, the present study contributes by proposing an institutional model that articulates these elements through a phased, competency-based, and collegial approach to AI integration in faculty development.

## 3. Methodology

This work describes the systematization of an institutional experience aimed at integrating artificial intelligence (AI) into higher education teaching. The process was carried out at the University of del Valle de Guatemala and led by the Center for Excellence in Learning and Teaching (CEAD), as part of the institution’s AI adoption strategy [1]. Its purpose was to identify, analyze, and strengthen teaching practices that incorporate AI into the teaching and learning process. Rather than applying a predefined

model, this experience was developed through an iterative and collaborative process involving faculty members and academic teams. This approach enabled the identification of real practices implemented across different disciplines, their analysis in terms of their contribution to student learning, and their alignment with the institution's competency-based educational framework. To structure this process, a sequence of coordinated activities was implemented and organized into four sequential phases. These phases were designed to systematize the experience, ensure alignment with institutional learning objectives, and support its use as a reference for faculty development. The four phases are described below.

### *3.1. Phase 1: Institutional Mapping of Teaching Practices*

The first phase focused on identifying existing teaching and assessment practices that incorporate artificial intelligence (AI) across different academic disciplines of the three UVG Campuses. To support this process, a structured survey was designed and distributed to faculty members who had previously demonstrated interest or experience in the use of AI in their teaching. The survey was structured to collect both descriptive and contextual information, including faculty perspectives on their use of AI in teaching, the perceived effectiveness of AI integration in the development of institutional competencies [11], and a description of up to three teaching practices implemented in their courses. The identification of participants was informed by prior institutional initiatives and internal collaboration within the academic team. The information collected allowed for an initial mapping of how AI was being used in teaching, while also capturing a set of practice-based examples grounded in real classroom experiences. The data collection process included follow-up communication to support participation and clarify responses when needed, establishing a comprehensive basis for the subsequent analysis and refinement phases.

### *3.2. Phase 2: Selection and Alignment with Institutional Generic Competencies*

The second phase focused on the review, selection, and alignment of the teaching practices collected during the previous phase. The practices were first examined to identify those that demonstrated an appropriate and ethical use of AI tools, based on the Institutional Guidelines for AI use [8] [9] and the Code of Ethics of UVG [10]. Following this selection, faculty members whose practices met these criteria were invited to further develop and expand their submissions using a standardized format designed to provide greater detail and pedagogical clarity, ensuring consistency in the documentation of each practice and preparing them for the subsequent collegial validation phase. The enriched practices collected through this process were then subjected to a systematic qualitative review, including the screening of submissions to identify incomplete or unclear descriptions, followed by direct communication with faculty members to expand and clarify the information when needed. In parallel, a comparative analysis was conducted to examine the relationship between each practice and the formal definitions of the university's generic competencies, allowing for a more consistent and explicit alignment. As part of this process, AI tools were used as a support mechanism to identify patterns and organize the information, while maintaining academic oversight in the review and decision-making process.

### *3.3. Phase 3: Interfaculty Collegial Validation*

The third phase focused on the collegial validation of the teaching practices through structured consultation sessions involving faculty members from different academic departments from the three UVG Campuses. The purpose of this phase was to strengthen the clarity, relevance, and potential applicability of each practice through peer dialogue and collective reflection. To support this process, three validation sessions were organized, in which selected practices were shared in advance with participants to allow for prior review. During the sessions, each practice was presented and discussed following a guided structure that encouraged feedback on two key aspects: the clarity of the description and its potential for implementation in other academic contexts. Faculty members contributed observations, suggestions, and recommendations based on their disciplinary perspectives and teaching experience. This phase emphasized collaborative engagement as a mechanism to refine the practices, ensuring that they were not only pedagogically sound but also understandable and transferable across different areas of knowledge.

### *3.4. Phase 4: Academic Standardization and institutional Documentation*

The fourth phase focused on the academic standardization and institutional documentation of the teaching practices following the collegial validation process. The purpose of this phase was to organize the practices in a consistent and structured format, ensuring coherence in their presentation and facilitating their use as a reference for faculty development. To achieve this, a writing and coordination team synthesized the validated practices by applying a standardized structure that included key elements such as pedagogical purpose, description of activities, use of AI tools, and alignment with institutional competencies. This process involved organizing, editing, and refining the content to ensure clarity, consistency, and fidelity to the practices discussed during the validation phase. The documentation process was conceived as the development of the first volume of an institutional series aimed at compiling and disseminating AI-integrated teaching practices, establishing a foundation for future volumes that will continue to expand and update the collection as the institutional experience evolves.

## 4. Process Outcomes

### *4.1. Phase 1: Institutional Mapping of Teaching Practices*

The first phase was implemented over a one-month period, beginning in the third week of August 2025 and concluding in the third week of September 2025. During this stage, a structured survey was distributed to 100 faculty members across the university's six academic faculties, of which 60 responded. The survey collected both contextual and practice-based information, capturing faculty profiles, their level of experience using AI in teaching, and their perceptions regarding the effectiveness of AI integration for the development of institutional competencies. In addition, respondents described up to three teaching practices incorporating AI, resulting in a total of 135 reported practices.
From a quantitative perspective, the results show that the participating faculty are highly experienced educators, with 45% reporting more than 15 years of teaching experience and an additional 32% reporting between 5 and 15 years, indicating a strong institutional base of pedagogical expertise (Fig 1).

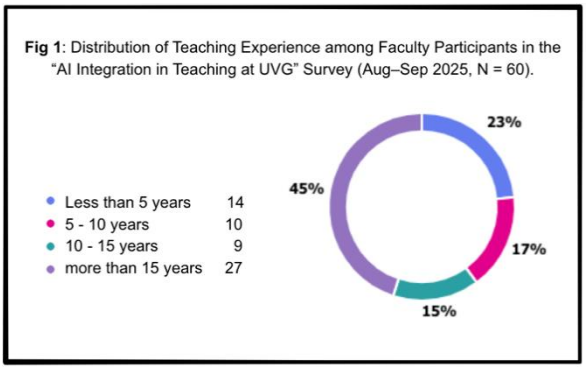


**Fig 1**: Distribution of Teaching Experience among Faculty Participants in the "AI Integration in Teaching at UVG" Survey (Aug–Sep 2025, N = 60).

In contrast, their experience with AI in teaching is relatively recent: nearly 70% of respondents reported having less than two years of experience integrating AI into their courses, with the majority indicating between six months and two years of use. Faculty responses also provide insight into current patterns of AI use in teaching. The data indicate that the integration of AI is primarily oriented toward supporting teaching and learning activities rather than being embedded as a fully structured pedagogical practice (Fig 2). Faculty reported varying levels of frequency in guiding students to use AI tools, suggesting that while its use is present in the classroom, it is not yet consistently incorporated across courses. These patterns reflect an emerging and exploratory stage of adoption, in which AI is being used as a support tool for teaching rather than as an integrated component of course design. Overall, these results indicate that the university is in an early stage of AI integration, characterized by high teaching expertise, emerging use of AI, and significant potential for institutional development.

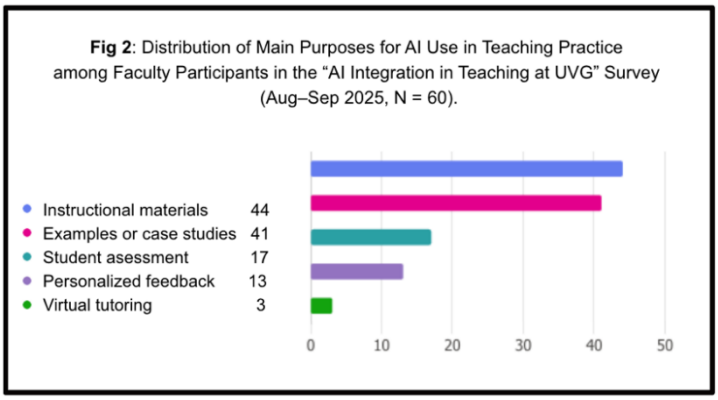


**Fig 2**: Distribution of Main Purposes for AI Use in Teaching Practice among Faculty Participants in the "AI Integration in Teaching at UVG" Survey (Aug–Sep 2025, N = 60).

### *4.2. Phase 2: Selection and Alignment with Institutional Generic Competencies*

The second phase was conducted during October 2025 and focused on the refinement, selection, and further development of the teaching practices identified in the previous stage. An initial filtering process was applied to the 135 reported practices, resulting in the identification of 87 practices considered as good practices, concentrated among 40 faculty members, based on predefined criteria related to the appropriate and ethical use of AI. Following this selection, a standardized format was distributed to these 40 faculty members to expand and enrich the description of their practices, ensuring greater clarity, pedagogical detail, and alignment with institutional competencies. Each selected practice required the completion of this standardized form, which provided a more structured and comparable description of the teaching experience. As a result of this process, 25 practices were submitted in the required format. A subsequent review led to the approval of 18 practices, while five were excluded for not meeting the established criteria, and two were deferred to a second volume of the document due to time constraints faced by faculty members. This phase strengthened the quality, consistency, and alignment of the practices, preparing them for the collegial validation process.

### *4.3. Phase 3: Interfaculty Collegial Validation*

The third phase was carried out during the first two weeks of November 2025 and focused on the interfaculty collegial validation of the selected teaching practices. During the first week, three structured validation sessions were conducted, in which a total of 18 practices approved in the previous phase were presented and discussed. In each session, six practices were evaluated by groups of 6 to 8 faculty members who had previously contributed good practices, fostering a peer-based review grounded in teaching experience. The sessions included the presentation of each practice followed by structured feedback focused on clarity, pedagogical coherence, and potential applicability in other academic contexts. As a result of this process, 17 practices were approved for continuation, while one practice was excluded from the process. During the second week, faculty members provided amendments and refinements to the practices based on the feedback received during the validation sessions, ensuring that each practice incorporated the necessary adjustments before moving to the final documentation phase.

### *4.4. Phase 4: Academic Standardization and Institutional Documentation*

The fourth phase was carried out from mid-November to mid-December 2025 and focused on the academic standardization and institutional documentation of the validated teaching practices. During this stage, the team from the Center for Excellence in Learning and Teaching (CEAD) was responsible for organizing, editing, and refining the content to ensure clarity, consistency, and fidelity to the practices discussed during the validation phase. This process resulted in the development of the electronic publication "*Buenas prácticas de integración de la Inteligencia Artificial generativa en la docencia. Volume 1* " [12], a 128-page document designed to provide faculty with practical examples, guidance, and recommendations on how to effectively integrate AI into their teaching. The publication encourages faculty members to adapt and apply these practices within their own academic initiatives, while maintaining a strong focus on student learning and the development of competencies aligned with the university's educational model (Fig 3).

The document was distributed to the university's faculty during the second week of December 2025. In the first trimester of 2026, the practices included in the publication were further disseminated through institutional faculty development spaces organized by CEAD. These included "CafeCITo con", a forum aimed at sharing teaching practices and fostering reflection and collaboration among faculty across departments, where 4 practices have been presented, and the "UVG Faculty AI Club", a space designed to explore and experiment with AI tools in higher education, where four practices have been presented. These dissemination efforts contributed to extending the impact of the initiative beyond documentation, promoting ongoing dialogue and engagement around the integration of AI in teaching.

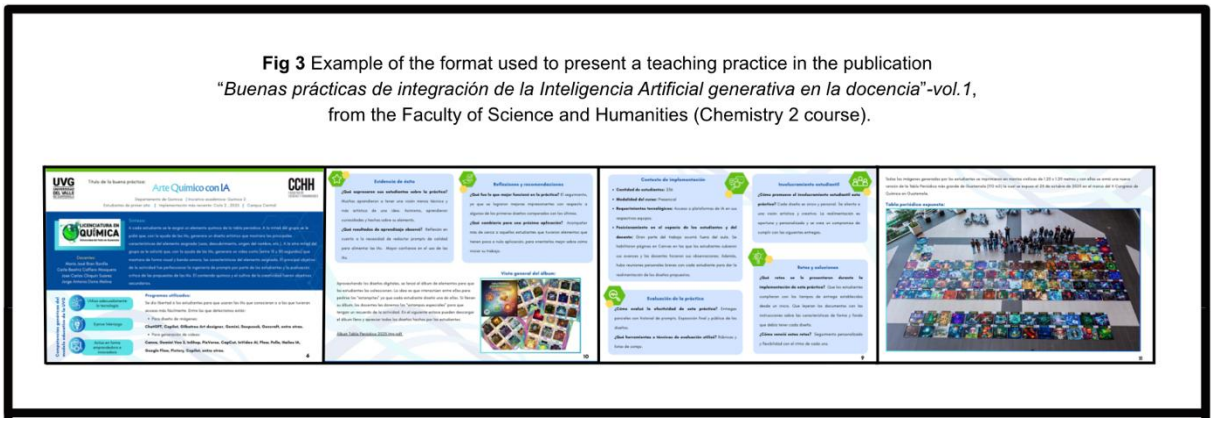


**Fig 3** Example of the format used to present a teaching practice in the publication "*Buenas prácticas de integración de la Inteligencia Artificial generativa en la docencia*"-*vol.1*, from the Faculty of Science and Humanities (Chemistry 2 course).

## 5. Conclusions

The integration of artificial intelligence (AI) in higher education requires more than isolated faculty initiatives; it demands structured institutional processes that guide, support, and align teaching practices with educational goals. The experience documented in this study shows that a systematic and phased approach enables institutions to move from dispersed individual practices toward a coherent and organized framework for AI integration in teaching.

A key finding of this experience is the central role of faculty as agents of innovation. The identification, refinement, and validation of teaching practices demonstrated that meaningful integration of AI emerges from real classroom experiences, which can be strengthened through collaborative processes. The collegial validation phase, in particular, proved to be critical in improving the clarity, relevance, and transferability of the practices across disciplines.

The process also highlights the importance of aligning AI integration with a competency-based educational framework. By connecting teaching practices with institutional competencies, the initiative ensured that the use of AI contributes directly to student learning and the development of the graduate profile, rather than remaining at the level of technological adoption.

Finally, this experience confirms that documenting and systematizing teaching practices is a valuable strategy for institutional learning. The development of a structured institutional document not only supports faculty development but also creates a shared reference that promotes consistency, reflection, and continuous improvement in the integration of AI in teaching.

## 6. Implications for Faculty Development and Institutional Practice

The experience documented in this study suggests that higher education institutions seeking to integrate AI into teaching should move beyond policy frameworks and focus on structured, practice-based processes. A phased approach—beginning with the identification of existing practices, followed by refinement, collegial validation, and institutional documentation—provides a clear pathway for organizing and scaling innovation in a coherent manner. This approach can be adapted to different institutional contexts, allowing universities to build on their own faculty experiences rather than relying solely on external models.

For faculty development, the findings highlight the importance of creating spaces for collaboration and peer exchange. Structured validation processes, such as interfaculty consultation sessions, not only improve the quality of teaching practices but also promote shared understanding and collective learning among educators. These spaces foster reflection, encourage the exchange of ideas across disciplines, and support the development of a community of practice around AI integration.

The study also underscores the need to align AI integration with competency-based educational frameworks. Institutions should ensure that the use of AI tools is explicitly connected to the development of student competencies and learning outcomes. This alignment helps avoid superficial or purely instrumental uses of AI and instead positions it as a means to enhance critical thinking, problem-solving, and autonomous learning.

Finally, the results point to the value of institutional documentation as a strategy for sustaining and disseminating innovation. Developing structured resources that compile validated teaching practices allows institutions to create shared references for faculty, support ongoing professional development, and encourage the adaptation of practices across different academic contexts. In this sense, the process also contributes to strengthening the Scholarship of Teaching and Learning (SoTL) as a means to systematically document, share, and reflect on teaching practices within a community of educators committed to learning from and with one another. Therefore, documenting and sharing good practices becomes a key mechanism for continuous improvement and long-term institutional transformation.

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