The impact of Artificial Intelligence on Instructional Design for University-Level courses in Mexico

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Introduction

Since its release to the general public in 2022, artificial intelligence (AI) has progressively integrated into educational processes, with a particular emphasis on areas such as instructional and curricular design. This incorporation is not an isolated phenomenon: previous research, such as that by Luckin et al. (2018) and Holmes et al. (2021), had already anticipated the strategic role AI would play in the planning and personalization of learning. In this rapidly accelerating landscape of digital transformation, it becomes crucial to analyze how instructional designers perceive, adopt, and adapt these technologies in their everyday professional practice.

This article aims to explore the impact of artificial intelligence tools on instructional design, based on the analysis of data collected through a questionnaire applied to instructional designers with diverse experience, actively working in the context of higher education in Mexico. Through their responses, we examine the key phases of educational design where AI has begun to intervene: from drafting learning objectives and creating activities, to developing rubrics and evaluating pedagogical alignment.

This inquiry is especially relevant in a national context where educational institutions face the challenge of designing flexible, scalable, and pedagogically sound models to meet new demands for educational access. Such is the case of the National Technological Institute of Mexico, which has launched a national project to expand engineering education through distance learning, highlighting the need to integrate educational technology and strengthen digital instructional design processes (National Technological Institute of Mexico, 2024). As UNESCO (2021) has emphasized, the integration of AI into higher education should not be limited to its technical adoption, but rather be guided by pedagogical, ethical, and inclusive principles that enable an educational transformation with a human-centered approach.

What tools are instructional designers using in their daily practice? In which phases of instructional design do they have the greatest impact? What limitations do they

perceive in integrating AI, and how do they address ethical, technical, and pedagogical challenges? The findings will not only help to understand the current role of AI in instructional processes but also provide contextualized evidence for the development of innovative curricular design models in higher education institutions in Mexico.

What do we understand by “Instructional Design”?

Instructional design (ID) should not be understood as a single, rigid, or universal process, but rather as an interdisciplinary field in constant evolution, shaped by diverse historical, geographical, and epistemological frameworks. For instance, in the United States, systematic approaches such as the ADDIE model or Backward Design (Wiggins & McTighe, 2005) prevail, emphasizing alignment between objectives, evidence, and activities. In Mexico, authors like Díaz Barriga (2005) propose situated sociocultural approaches that view context as an integral part of learning; while in China, recent reviews (Xu & Deng, 2024) document how instructional design has focused on differentiated strategies, integrating technologies in large-scale educational contexts.

This diversity of models reflects the various purposes of instructional design—from ensuring the learning of specific content to promoting the development of transferable competencies—and is influenced by educational trends, available technological resources, and the dominant learning theories in each context. As a field of action, ID draws from disciplines such as learning psychology, systems theory, pedagogy, educational technology, knowledge engineering, and computer science, allowing it to articulate both analytical and creative processes (Rodríguez, 2009; Belloch, 2012).

In general terms, it is recognized as a systematic and deliberate process for designing learning experiences, based on needs analysis, definition of objectives, content organization, selection of methodological and technological strategies, and formative and summative evaluation (Muñoz-Sánchez et al., 2023). Models such as Dick and Carey or Gagné offer structured approaches focused on measurable outcomes, while the ASSURE model emphasizes the role of the learner as the center of the process, intentionally integrating technological media (Belloch, 2012).

The contemporary approach to instructional design acknowledges that it is not merely about selecting media or applying technical formulas, but about making well-founded pedagogical decisions that coherently align objectives, methodologies, resources, and evaluation. Therefore, its implementation in technology-mediated environments, such as e-learning, b-learning, or intelligent educational ecosystems, demands a critical, reflective, and situated stance (Díaz Barriga, 2005; Walters & Newman, 2008). Understanding ID, then, means recognizing it as a strategic

pedagogical practice, aimed at fostering meaningful, sustainable, culturally relevant, and ethically responsible learning.

What is Artificial Intelligence and which relationship does it have with Instructional Design?

Artificial intelligence (AI) is an interdisciplinary field of computer science and cognitive sciences, aimed at developing systems capable of performing tasks that traditionally require human intelligence, such as reasoning, learning, decision-making, or natural language processing. Its development has been driven by machine learning and deep learning models, which can identify complex patterns from large volumes of data (Holdsworth, 2023). In the educational context, AI has become a key technology due to its ability to automate processes, generate content, anticipate behaviors, and enhance pedagogical decision-making, offering new possibilities for personalized learning and instructional innovation (Stryker & Scapicchio, 2024; Mucci, 2024; Saminzhonova, 2025).

Currently, at least three functional categories of AI with significant applications in education are recognized: generative AI, predictive AI, and adaptive AI.

Generative AI refers to systems capable of creating new content based on patterns learned from massive datasets. It operates through large language models (LLMs) that allow users to interact through natural language, making it particularly useful for tasks such as drafting materials, generating exercises, building rubrics, or prototyping instructional resources (Stryker & Scapicchio, 2024).

Predictive AI, on the other hand, uses statistical analysis and machine learning to identify past trends and anticipate future behaviors. In education, this technology is used for learning analytics, identifying at-risk students, personalizing learning pathways, or making informed decisions about continuous improvement of the learning process (Mucci, 2024). Its ability to synthesize historical data strengthens the design process from an evidence-based perspective.

Finally, adaptive AI represents an evolution of the generative approach, incorporating reinforcement learning mechanisms and intelligent agent design, allowing systems to modify their behavior based on contextual data not originally foreseen. This type of AI learns continuously and adjusts in real-time, facilitating the design of personalized and scalable experiences that dynamically adapt to each student's progress and learning style (Arsys, 2024).

These three categories are not mutually exclusive but form a complementary ecosystem of tools with high potential to enhance educational processes. However, as Saminzhonova (2025) warns, their implementation without clear pedagogical frameworks or defined ethical criteria can lead to fragmented integration, focused on efficiency rather than the quality of learning. Therefore, understanding what AI is also

involves questioning how, for what purpose, and under what conditions it should be integrated into the educational field, and especially into processes such as instructional design, where technology must serve pedagogical intent, not the other way around.

The incorporation of AI into instructional design has begun to significantly impact workflows in higher education. According to Bolick and Da Silva (2024), its implementation has optimized key phases such as course planning, content generation, performance analysis, and automated feedback, which has transformed the role of the instructional designer by integrating them into more automated but also more organizationally complex systems. This transformation requires not only technical skills but also competencies to pedagogically mediate the products generated by AI.

Weng et al. (2024) argue that these technologies have brought concrete benefits in the design of interactive activities, immediate feedback, and performance improvement in tasks requiring computational thinking, creativity, and problem-solving. However, the authors also point out that many studies adopt a technocratic perspective, insufficiently addressing the pedagogical frameworks that should guide the use of these tools.

Having described the functional categories of AI and its potential in educational environments, it is necessary to examine how these technologies are transforming instructional design as a pedagogical and professional practice. Far from being limited to a technical assistance function, AI is directly influencing the ways we plan, produce, implement, and evaluate learning experiences, reconfiguring tasks, roles, and quality standards in higher education.

Instructional designers and faculty have begun to incorporate AI systems—especially generative, predictive, and adaptive—to automate repetitive tasks, develop instructional materials, provide feedback on activities, and analyze student performance data (Weng et al., 2024; Aparicio-Gómez & Aparicio-Gómez, 2024). As evidenced by the responses from the research instrument and highlighted by Saminzhonova (2025), the integration of AI into instructional design is neither a neutral nor linear process. It involves new pedagogical decisions, ethical challenges, methodological tensions, and the need to reconsider the role of the professional who designs for learning. These implications are explored further in the following sections, based on the concerns and challenges expressed by the surveyed instructional designers.

Pedagogical risks and tensions in the incorporation of AI into Instructional Design

Despite its advantages, the incorporation of artificial intelligence into instructional design presents significant risks that require critical attention. Among these are the potential dehumanization of the educational relationship, excessive reliance on automated tools, and the reproduction of algorithmic biases if their use is not pedagogically contextualized (Hodges & Kirschner, 2024; Al-Zahrani & Alasmari, 2024; UNESCO, 2024). From a digital justice perspective, Araya and Peña (2023) warn that AI systems tend to replicate social inequalities, such as gender biases, if they are not trained with inclusive criteria—reinforcing the need for critical literacy regarding the design and use of algorithms. Furthermore, various reports highlight the risk that these tools may reproduce social biases, exacerbate inequality in access to knowledge, compromise academic integrity, or even be used for commercial purposes without a clear regulatory framework (Centroi, 2023; UNESCO, 2021).

Likewise, superficial use of AI risks being limited to task automation without transforming the underlying pedagogical practices. As illustrated by the SAMR model, this type of incorporation remains at the levels of substitution and augmentation, without reaching a meaningful redefinition of learning (Rebolledo & Veas, 2022). To mitigate these risks, it is essential that instructional designers develop critical competencies that enable them to evaluate the quality of AI-generated outputs, detect biases, correctly attribute authorship, and safeguard a student-centered pedagogical approach.

International and national landscape on the impact of AI on ID

At the international level, the use of AI in instructional design has begun to consolidate as a viable strategy to personalize learning, optimize pedagogical planning processes, and generate educational resources in less time (Li et al., 2025; Pentucci et al., 2024). In contexts such as China and Italy, for example, there have been documented training experiences where ChatGPT has been employed to generate lesson plans, provide automated feedback, and support teacher training in learning design, fostering critical reflection and continuous improvement in educational practice (Li et al., 2025; Pentucci et al., 2024). These advances suggest that artificial intelligences, particularly generative ones, are shaping a new environment of co-creation between humans and machines in the educational field (Pentucci et al., 2024).

In contrast, in Mexico, studies on the impact of AI on instructional design are still incipient and scattered. Although relevant efforts have been identified, such as those by Román Méndez and Pérezchica Vega (2024), who conducted a systematic review on the emerging role of AI in instructional design, specialized national literature

remains limited. Other research, such as that by Martínez Vázquez (2023), focuses on inclusive education from a regulatory framework, without directly addressing instructional design practices. Even in recent works published in pedagogical journals, it is acknowledged that it is still unclear how educators should prepare to adapt their design processes to the emergence of AI in higher education (Benita, 2023).

This gap highlights a divide between global technological development and local pedagogical appropriation. Therefore, this article aims to present empirical findings on how a group of instructional designers in Mexico are using, adapting, and evaluating AI tools in their design processes. Through the analysis of their practices, it seeks to contribute to the current debate on the relevance, viability, and risks of incorporating AI into the configuration of learning models in higher education. This inquiry becomes especially relevant in a context where instructional design is called not only to respond to technological changes but also to rethink its pedagogical and ethical foundations in the face of the automation of educational thought.

Study context and design

To understand the impact of AI on instructional design in Mexico—specifically from the perspective of a group of resilient instructional designers based mainly in Guadalajara, Jalisco—a questionnaire was developed using Google Forms as part of a research project structured in three phases. The study aims to analyze the integration of AI across three key dimensions of the university educational ecosystem: instructional design, teaching practice, and the student learning experience. In this context, the concept of an educational ecosystem is understood as the interrelated set of actors, technological resources, institutional environments, and pedagogical dynamics that influence teaching and learning processes.

The instrument was administered to designers who have collaborated on educational innovation projects with institutions such as PLAi, TSJ en Línea, UNIVA, and UdG, with the intention of generating contextualized evidence about real uses, perceptions, levels of technological appropriation, and challenges faced in using AI for course and subject design. The questionnaire was designed not only to identify positive impacts, such as task automation or content personalization, but also to recognize tensions, limitations, training gaps, or ethical dilemmas, with the aim of detecting areas of opportunity in the process of technological adoption.

Based on the information gathered, it is expected to generate inputs that guide the improvement of instructional design models adapted to highly technologized contexts. In this emerging scenario, AI tools not only modify pedagogical practices but also demand a redefinition of the skills that students and educators must develop: critical understanding, reflective evaluation, and co-construction of knowledge with intelligent technologies.

Methodologies

This study adopts a mixed, descriptive-exploratory approach, with the purpose of analyzing how a sample of instructional designers from Guadalajara, Jalisco, Mexico, perceive, adopt, and adapt AI tools in their daily professional practice. The descriptive nature of the study allows for the systematization of usage trends, perceived usefulness, and impact of AI tools across different phases of instructional design, while its exploratory nature addresses the need to generate preliminary knowledge about an emerging phenomenon, in a context still undergoing techno-pedagogical transformation. Given that the use of AI tools in university-level instructional design is still a recent and evolving phenomenon, this study seeks to provide an initial insight into how these tools are being used, what benefits they bring, and what challenges they present, from the direct experience of those engaged in instructional design.

The sample consisted of 16 instructional designers currently collaborating with Mexican higher education institutions, whether institutionally, independently, or under mixed schemes. The selection criterion was non-probabilistic and intentional, focused on the knowledge and experience of participants in designing courses, resources, and educational materials, in virtual or hybrid modalities. Most participants reported between 3 and 15 years of experience in the field, with educational backgrounds ranging from undergraduate to postgraduate degrees, highlighting a predominantly pedagogical and technological professional profile.

Of the total participants, 56.25% work under mixed schemes (institutional and independent), while 18.75% work exclusively as freelancers. Regarding the frequency of AI tool usage in their daily work, over 62% reported using AI regularly, and an additional 18.75% indicated using it at all times. This profile reflects a diverse sample in terms of professional trajectory, working conditions, and levels of technological adoption, providing a representative snapshot of the current professional ecosystem surrounding instructional design mediated by emerging technologies.

To gather information, a digital questionnaire composed of 28 items was designed and administered via Google Forms. The instrument was developed based on the study's objective and structured into thematic blocks to explore both general perceptions of AI use and its specific application across various phases of instructional design, including content generation, evaluation, pedagogical alignment, and institutional relevance.

The questionnaire included multiple-choice questions, Likert scale items, and an open-ended section for extended comments. The diversity of formats allowed for the collection of both quantifiable data and qualitative opinions from participants, thus enabling a more comprehensive analysis. The instrument was previously reviewed

by an expert in educational design with experience in teacher training to ensure the clarity of the questions and their alignment with the study's overall objective.

The questionnaire was distributed during the last week of November 2024 and remained open throughout December and January 2025. The invitation was directed at a specific group of instructional designers who had previously collaborated on various educational projects with institutions such as PLAi, TSJ en Línea, UNIVA, and the University of Guadalajara (UdG). This network of collaboration facilitated access to professional profiles with direct experience in instructional design for higher education, in both virtual and hybrid environments.

To maintain proper control over responses and avoid duplications, participants were asked to provide their name and email address, with the assurance from the outset that the data would be used exclusively for academic purposes and kept confidential. By the end of the survey period, a total of 16 complete responses were obtained, which served as the basis for analyzing perceptions, practices, and uses of AI tools in contemporary instructional design.

The analysis of the collected data was conducted using a mixed approach, combining descriptive quantitative procedures with thematic qualitative analysis, which allowed for an understanding of both the frequency and general usage trends of AI tools, as well as the values and experiences expressed by the instructional designers.

For the closed-ended questions, a descriptive statistical analysis was applied, including the calculation of absolute frequencies, percentages, and graphical representations, facilitating the identification of usage patterns, levels of adoption, and areas of AI application across different phases of instructional design. This analysis was organized into thematic blocks linked to the phases of instructional design: resource generation, objective writing, activity design, rubric development, pedagogical alignment evaluation, and verification of institutional educational models. Microsoft Excel was used to organize and visualize this data, allowing for a clear and systematic classification of responses.

For the open-ended questions, a manual thematic coding process was used, based on repeated review of the texts and grouping of responses into emerging categories. This process made it possible to capture key perceptions regarding the advantages, limitations, ethical challenges, and necessary conditions for meaningful AI integration into instructional design. The responses were read in full and categorized into common thematic clusters, facilitating the interpretation of the discourse from a pedagogical perspective.

The combination of both approaches not only allowed for a description of the current use of AI but also provided insight into how the experience and professional judgment of instructional designers modulate its pedagogical integration, thereby

opening the possibility of identifying best practices, structural tensions, and areas of opportunity for future research and formative interventions.

Results

Participants profile

The sample consisted of 16 instructional designers with proven experience in the creation of educational resources and activities, primarily in virtual and distance learning environments.

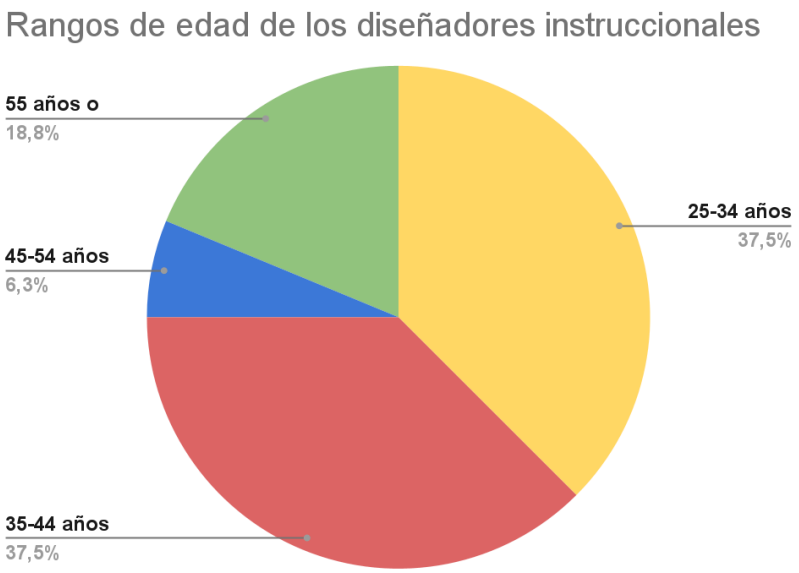

Gráfico 1: Rangos de edad de los diseñadores instruccionales encuestados. Autoría propia.

The ages of the participants ranged from 27 to 74 years, with most falling within the 25 to 34 years (6 individuals) and 35 to 44 years (6 individuals) age groups, which together represent 75% of the total respondents. This distribution suggests the participation of both younger instructional designers, possibly in the early stages of their professional development, and more established profiles. Additionally, the presence of participants over the age of 55 reveals longer career trajectories, which enriches the intergenerational perspective on AI use in the educational field.

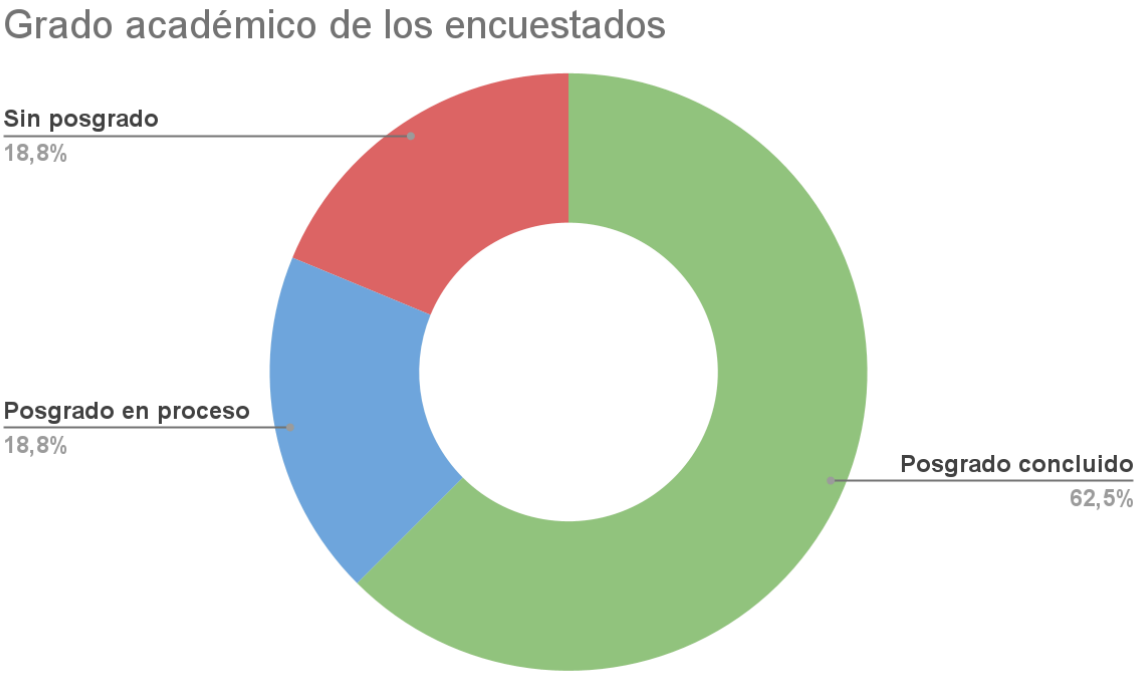

Gráfico 2: Grado académico de los diseñadores instruccionales encuestados. Autoría propia.

Regarding educational background, the majority of participants hold completed postgraduate degrees (10 out of 16), while a smaller proportion are currently in training (3 individuals) or have not undertaken formal postgraduate studies (3 individuals). This academic diversity allows for the observation of AI adoption from different stages of professional development, providing a richer and more heterogeneous perspective for analysis. The high presence of participants with postgraduate training may also be associated with greater familiarity with pedagogical and technological innovation processes, while those in training or without formal postgraduate education contribute a practical and experiential perspective, equally valuable for understanding the current challenges of instructional design in digital contexts.

In terms of employment type, most participants (9 out of 16) reported working under a mixed scheme, combining institutional roles with independent projects. Three designers stated that they work exclusively as freelancers, while two work solely for an institution. There were also atypical cases: one retired individual and another who is not currently working because they are focused on their studies. This composition highlights the flexibility of the contemporary instructional designer's professional profile, as well as the coexistence of multiple career paths within the professional ecosystem.

Gráfico 3: Grado académico de los diseñadores instruccionales encuestados. Autoría propia.

In relation to professional experience in instructional design, participants were distributed across four ranges: the group with 3 to 5 years of experience was the most represented, with 6 individuals; followed by those with 6 to 10 years and 11 to 15 years, with 4 participants each. Finally, the group with more than 16 years of experience consisted of 2 individuals. This diversity in professional trajectories allows for the analysis of the phenomenon from an intergenerational perspective, acknowledging both those who are consolidating their professional practice and those with long-established careers. This breadth enriches the analysis by allowing us to identify how experience influences the appropriation, critical use, and expectations regarding emerging technologies such as AI.

Frecuencia de uso e inteligencias artificiales utilizadas

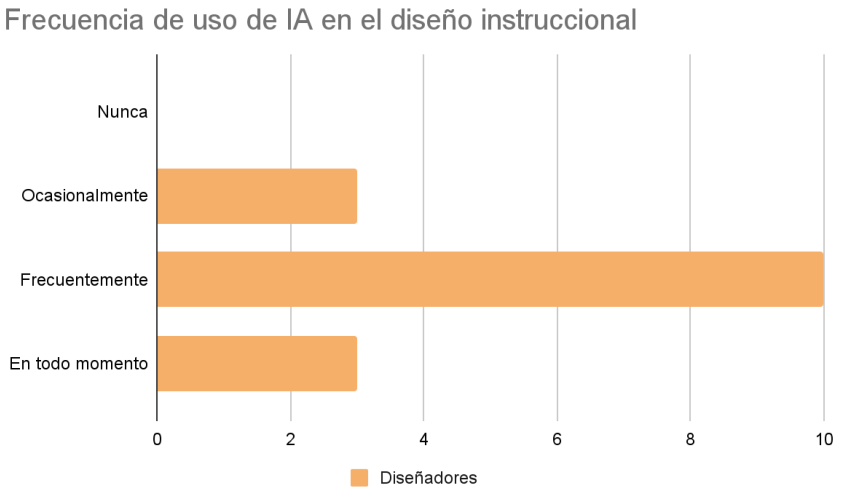

Gráfico 4: Frecuencia de uso de las Inteligencias Artificiales por parte de los diseñadores instruccionales. Autoría propia.

According to the results obtained, the use of AI tools in instructional design work is an increasingly widespread practice. 62.5% of participants reported using them frequently, while 18.75% use them occasionally and another 18.75% indicated that they integrate them at all times. No participant reported not using them, which confirms an active appropriation of these technologies, albeit with varying degrees of depth.

Regarding the most commonly used tools, the widespread use of ChatGPT stands out, being mentioned by all participants. It is followed by Gemini (10 mentions), Perplexity (7), NotebookLM (4), and Claude (3). The remaining tools—such as DALL·E 2, Copilot, YouChat, D-ID, CYPHER LEARNING, or Bing—were each mentioned by only one person and were grouped under the “Other” category in the corresponding chart. This concentration around a few options suggests that familiarity, accessibility, and cost-free availability strongly influence adoption.

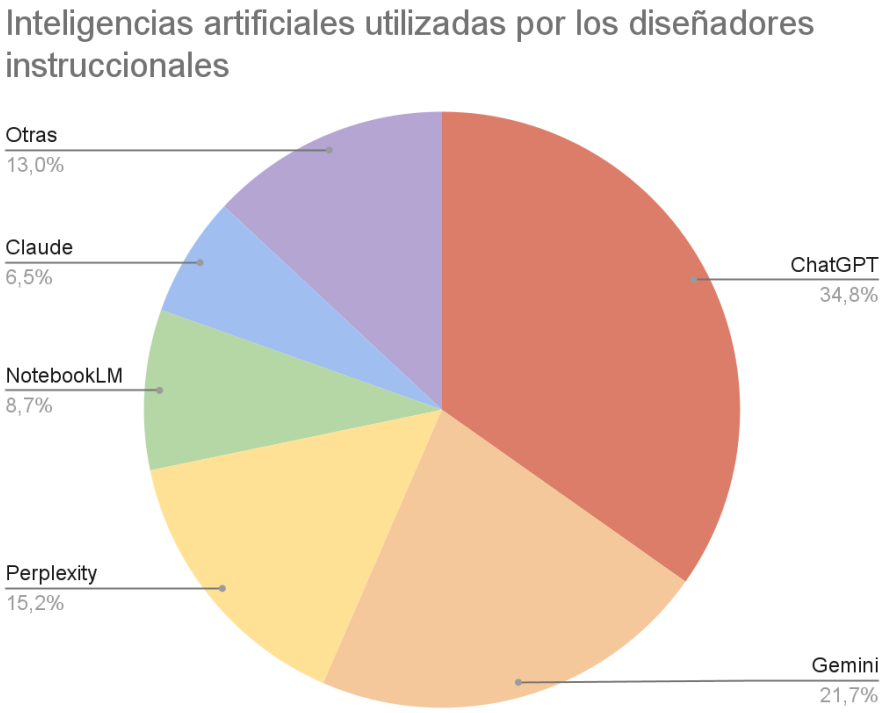

Gráfico 5: Inteligencias artificiales utilizadas por los diseñadores instruccionales. Autoría propia.

This overview shows that, although most instructional designers focus their work on one or two main platforms, there is a growing interest in exploring new specialized tools, aimed at improving visual quality, diversifying resources, or saving time on repetitive tasks. Moreover, the variety of tools mentioned suggests different levels of appropriation and varying degrees of experimentation, which will be contrasted with the specific phases of instructional design in the following sections.

Applications of AI in the phases of ID

Analysis and diagnostic phase

This first stage of instructional design involves tasks such as diagnosing learning needs, identifying student profiles, reviewing previous courses, and detecting areas for improvement. In this phase, the surveyed instructional designers reported using AI tools mainly as exploratory and organizational support, aimed at better understanding the context upon which the educational proposal will be built.

Qualitatively, several participants noted that they use ChatGPT, Gemini, and Perplexity for initial inquiries into topics related to the course, to prioritize key concepts, contrast different approaches, or draft preliminary diagnostic outlines. One respondent highlighted that they use AI to "better understand the topic around the design I will create, identify key ideas, and from there begin the design," which reflects a cognitive support role in structuring the pedagogical starting point.

Other participants mentioned tasks such as synthesizing general information, formulating key questions for needs assessment, or even generating arguments that are later validated or adjusted through professional judgment. In this context, AI is configured as an assistant for structured thinking and preliminary exploration, facilitating the initial approach to the design project.

From a quantitative perspective, while this phase was not identified as one of the most impacted in perception scales (compared to later phases like rubric generation), it was frequently mentioned in multiple testimonies as a usual starting point for organizing the design process, particularly in online modalities. Its usefulness is expressed not so much in the production of deliverables, but in the reflective support it offers to clarify the didactic approach or detect blind spots before initiating the structural design of the course.

In general terms, this phase demonstrates an instrumental use of artificial intelligence that does not replace contextual analysis or consultation with experts, but allows instructional designers to build an informed and flexible foundation from which to project the pedagogical design. This preparatory function connects directly with the next phase of the process: the formal design of learning objectives and pedagogical strategies.

Pedagogical design phase: objectives and strategies

In the second stage of instructional design, which includes the formulation of learning objectives and the definition of pedagogical strategies, AI tools showed a more consolidated level of adoption among participants. This phase was reported as one of the phases with the highest perceived impact: eight participants rated the

contribution of AI to drafting learning objectives as "significant," making this task the most frequently mentioned in that specific category.

In the qualitative responses, this trend is reinforced by various mentions of using ChatGPT, Gemini, Claude, and Copilot for tasks such as drafting objectives, clarifying disciplinary content, proposing evaluation criteria, and creating project follow-up messages. One participant noted that they use these tools to "review and design objectives, evaluation criteria, perform style correction and editing," which highlights a functional appropriation aimed at structuring key course components with greater clarity and speed.

AI was also mentioned as a tool for resolving technical or conceptual doubts and even for generating comparisons between different ways of phrasing the same learning objective. This practice suggests that artificial intelligence is being used as a linguistic-pedagogical consultant, not only to draft but also to contrast and refine previous formulations, enabling the designer to make more informed decisions.

Overall, the evidence suggests that AI tools are being used to streamline the initial drafting of objectives, improve their precision, and facilitate alignment between goals, content, and assessment—functions that traditionally required significant time and cognitive effort. Unlike the analysis phase, here AI not only organizes or suggests ideas but also produces directly functional inputs for pedagogical design.

Development phase: materials and activities

The development phase involves the creation of content, instructional resources, learning activities, assessment instruments, and multimedia materials, requiring intensive work in both pedagogical and production terms. According to the study results, this is one of the phases where AI has taken on a prominent role, both in terms of frequency of use and perceived impact.

Quantitatively, five participants rated the impact of AI on the generation of resources and activities as "very significant," and another five rated it as "significant," indicating a high and consistent level of appropriation. This perception was reinforced by numerous qualitative responses, mentioning the use of tools like ChatGPT, Gemini, Perplexity, Claude, NotebookLM, and CYPHER LEARNING to create instructional material aligned with learning objectives, activity proposals, practical exercises, thematic content, study guides, summaries, and case analyses.

One participant shared that they use these tools to "generate resources such as readings, assessments, video scripts, or assembly narratives," while another noted their usefulness in "creating videos, audios, content integration, and evaluation proposals." These uses reflect a diversification of applications, ranging from textual drafting to multimedia resource generation, even relying on platforms like DALL·E 2 and D-ID.

It is worth highlighting the development of assessment instruments, particularly rubrics and checklists, which were identified as recurring tasks. In fact, this was the phase with the highest concentration of responses rating the impact as "very significant" (seven participants), followed by five more who perceived it as "significant." AI is used to propose structures, criteria, and performance levels, providing instructional designers with a draft on which to apply their pedagogical judgment.

Beyond the instructional products themselves, several participants mentioned using AI for tasks such as spell checking, style correction, and editing, as well as for generating preliminary versions of content that are later adapted or refined according to the course's needs. In some cases, multiple tools were combined (ChatGPT + Gemini + Perplexity) to compare results, select relevant ideas, and build more robust materials.

These findings reveal that artificial intelligence plays a dual role in this phase: accelerating the production of materials and enhancing the initial quality of inputs, facilitating pedagogical decision-making, and allowing instructional designers to focus on tasks of review, adjustment, and adaptation. Consequently, AI acts as an extension of pedagogical work, but under the critical control of the professional.

Implementation and monitoring phase

The implementation phase involves launching the course, as well as monitoring and supporting the learning process by the instructor or academic team. Although this stage is more closely associated with direct teaching than with instructional design, several study participants identified specific uses of AI tools to facilitate educational communication, project follow-up, and continuous improvement of the learning process.

From a qualitative perspective, some designers reported using ChatGPT, Gemini, Claude, and Copilot to draft follow-up messages, clear instructions, introductory notes, or progress updates, addressed to both students and collaborating instructors. These applications help systematize interaction and maintain communicative clarity in asynchronous environments, particularly in online education.

AI was also mentioned as a tool to resolve technical or conceptual doubts during the implementation phase, and as an "expert consultant" supporting the designer in real-time material review or validation of ideas proposed by subject matter experts. One participant stated that they use these tools to "clarify concepts or content I don’t understand and need to know to check for coherence between what the expert proposes and the disciplinary content."

This type of use indicates a shift in AI’s role from content generation to contextual support of the process, helping maintain pedagogical coherence across the phases

of design, implementation, and evaluation. In some cases, AI was also used to draft personalized message scripts or create feedback sequences or recommendations to reinforce learning—functions especially valuable in high administrative workload environments.

Learning evaluation phase

The evaluation phase is one of the most sensitive moments in instructional design, as it involves assessing the achievement of expected learning outcomes, validating the coherence between objectives and activities, and making pedagogical decisions that directly affect students. In this section, the study results show a partial and still cautious adoption of AI tools.

Quantitatively, the evaluation of learning outcomes was identified by two participants as a phase where AI has no impact, and by at least one other as an area of "low impact." This perception suggests that, unlike other more technical or structured stages, evaluation is still seen as a process requiring contextual interpretation, pedagogical judgment, and disciplinary knowledge that AI cannot accurately replicate.

However, the qualitative data reveal important nuances. Some participants reported using AI for the generation of evaluation instruments, such as rubrics, checklists, and test items, which is more linked to the development of materials than to the interpretation of results. Others mentioned using AI to draft evaluation proposals, review the wording and style of instructions, or compare different evaluation approaches, indicating a support role in constructing criteria and mechanisms, but not in final evaluative decision-making.

An interesting point is the reference to AI as a resource for curating evaluable content or generating preliminary versions of instruments that are later modified to meet quality standards or institutional educational models. In this sense, a pattern similar to other phases is observed: AI does not replace the evaluative task but can reduce the initial operational load by providing structures or ideas that are then professionally refined.

Another element to consider is AI's difficulty in understanding or applying specific institutional criteria or formative assessment approaches. This may explain why verifying the relevance of activities to the educational model was one of the lowest-rated phases in terms of perceived impact: two participants reported "no impact" and one more "low impact" in this regard. These responses reflect that AI is still unable to interpret regulatory contexts, understand complex curricular frameworks, or apply situated pedagogical criteria, which are central elements in authentic assessment.

Challenges, concerns and conditions for implementation

Despite the growing incorporation of AI tools into instructional design, study participants identified significant limitations that hinder their full and pedagogically grounded integration. Among the main concerns is the lack of formal training in the use of these tools, which has led to a self-taught, fragmented adoption with little institutional support.

Institutional frameworks also posed constraints, particularly when validating the relevance of activities against the prevailing educational model. In these phases, AI is perceived as having less impact, as it struggles to accurately interpret the specific pedagogical and regulatory criteria of each institution.

Participants also expressed ethical and technical reservations, such as potential bias in AI-generated results, limited personalization of content, or excessive dependence on AI for key design decisions. These concerns align with the warnings of the *Beijing Consensus on AI and Education* (UNESCO, 2019), which emphasizes the importance of clear ethical guidelines and well-trained educators to ensure the responsible use of these technologies.

Additionally, obstacles related to technological accessibility were mentioned, as many advanced tools require paid versions or levels of proficiency that not all designers possess. As Romero (2023) warns, without adequate structural conditions, "AI runs the risk of reproducing inequalities, even in scenarios where innovation is the goal."

In light of this situation, participants agreed that specific pedagogical training, the development of ethical criteria, and the updating of institutional policies are necessary conditions for an effective, critical, and contextualized implementation of AI in university-level instructional design.

Discussion

Based on the results obtained from the instrument applied to the sample of instructional designers, it can be affirmed that AI has progressively integrated into instructional design practices in higher education in Mexico, although unevenly depending on the phase of the process, the professionals' level of experience, and the institutional conditions in which they work.

As stated in the initial hypothesis, AI is reshaping pedagogical practices: it is no longer seen solely as an emerging innovation but has become an everyday tool that assists, and in some cases enhances, various tasks in educational design. Its most consolidated use was observed in structured phases such as the generation of resources, activities, and assessment instruments, where it provides models, syntax,

and structures that help speed up processes and improve the technical quality of the products generated.

In contrast, the application of AI tools remains limited in those phases of instructional design that require a deep understanding of the educational context and nuanced pedagogical judgment, such as alignment with institutional educational models or the assessment of complex learning outcomes. As UNESCO (2021) points out, these technologies are still not capable of operating with situated ethical and pedagogical criteria, which poses a risk when sensitive decisions are shifted to automated processes. Similarly, Ch'ng (2023) argues that although AI has proven effective in structured tasks, it still cannot replicate pedagogical intuition or understand the educational principles that guide decision-making in real and diverse contexts.

Moreover, the qualitative results confirmed that while AI represents an opportunity to personalize processes and reduce operational load, its implementation faces ethical, technical, and pedagogical challenges that must be addressed to ensure its effective and responsible use. The lack of systematic training, regulatory uncertainty, growing dependence, and limited critical understanding of the boundaries of these technologies were identified as recurring barriers.

From a pedagogical perspective, AI does not replace the instructional designer, but it does modify their role: shifting them from being solely a technical producer to a more strategic and mediating function, where they must discern what to delegate, how to adapt, and when to intervene. This transformation demands new professional competencies that combine technical skills with critical thinking and ethical principles.

In summary, the findings validate the proposed hypothesis: AI is having a significant impact on university instructional design practice, opening real opportunities for innovation, but also revealing tensions that must be addressed from a comprehensive educational perspective, sensitive to context and focused on meaningful human-centered learning.

Pedagogical implications

The study results confirm that the integration of AI tools into instructional design is modifying not only the technical processes of design but also the pedagogical practices that underpin it. This change does not occur uniformly but reveals new demands for professionals developing educational proposals in university environments.

First, the frequent use of AI for tasks such as drafting objectives, generating activities, and creating assessment instruments shows that instructional designers are incorporating these tools as operational supports that optimize time and allow for the systematization of pedagogical products. However, this practice also requires

new capabilities, such as interpreting the results generated, adjusting them to institutional educational models, and deciding when a deeper human intervention is necessary.

This finding suggests that the role of the instructional designer is shifting toward a more strategic and deliberative function, where it is not enough to simply execute tasks, but one must make informed decisions about what to delegate to AI, how to evaluate the quality of its outputs, and when it is essential to rely on professional judgment to ensure didactic coherence.

Second, the concerns expressed by participants regarding the lack of training, the difficulty in adapting AI-generated outputs to normative criteria, and the uncertainty about the ethical use of these tools reveal that AI appropriation has so far been a self-managed practice. Far from being part of a coordinated institutional strategy, learning to use these technologies has occurred informally, among colleagues or through individual exploration. This situation highlights the urgency of creating spaces for collaborative training, sharing best practices, and collective reflection, where instructional designers can discuss their experiences, compare pedagogical decisions, and build common criteria for a more effective and conscious integration of AI into educational design.

Beyond technical and methodological challenges, the incorporation of AI into educational contexts demands a deep ethical reflection on its use and purpose. As Guerra (2024) states, fundamental ethical principles in education must ensure transparency, privacy, inclusivity, governance, and a human-centered approach in the development and use of these technologies. Applied to the field of instructional design, these principles require that every technological decision be pedagogically informed and aligned with values that ensure equity, the protection of student data, and the conscious participation of educators in the implementation of automated systems. In this sense, training instructional designers in specific ethical competencies—such as authorship attribution, informed consent, the evaluation of algorithmic bias, and contextualized decision-making—becomes an urgent need in the highly technologized environments in which university education currently operates.

Perspectives scenarios for ID with AI

The findings of this study offer a glimpse into future scenarios of pedagogical transformation, where AI will cease to be a disruptive novelty and become a structural component of educational design. Although its adoption in professional practice has largely emerged from individual initiative, the consolidation of its use will have profound implications for how learning processes are designed, supported, and assessed in higher education.

One of the most likely scenarios is the consolidation of the instructional designer as a strategic mediator, capable of integrating AI in a critical, creative, and context-sensitive manner. This transformation does not imply a replacement of their functions but rather an expansion of their capacity to generate more agile, adaptive proposals aligned with institutional pedagogical principles. As Holmes et al. (2021) suggest, the true impact of educational AI lies not only in its computational power but in how professionals interpret it, adapt it, and translate it into meaningful experiences for students.

Likewise, a diversification of the tool ecosystem is foreseeable, which will require designers not only to master multiple platforms but also to manage, with pedagogical judgment, the quality, relevance, and coherence of the products generated. This evolution points toward a more flexible professional profile, capable of navigating various technological environments and making decisions based on equity, ethics, and learning improvement. In the words of UNESCO (2021), a new pedagogical and digital literacy will be required to enable educators to "use AI to expand, not reduce, their professional agency."

Another relevant scenario is the configuration of new regulatory and institutional frameworks to govern the use of artificial intelligence in instructional design and teaching processes. The study data reveal that the absence of clear guidelines generates ambiguity, insecurity, and unequal appropriation of these technologies among education professionals. This finding aligns with what Lee et al. (2024) report as key challenges: the lack of systematic training in AI tools, the urgent need for flexible institutional policies, and the redefinition of the teaching role in relation to students who are already actively interacting with these technologies. In this regard, the Beijing Consensus on AI and Education (UNESCO, 2019) emphasizes that the development of inclusive, ethical, and learner-centered policies will be essential to ensure that AI integration in higher education effectively contributes to learning goals of quality, equity, and sustainability.

Finally, there is a prospect that these technologies will drive the emergence of new instructional design models that are more iterative, customizable, and network-oriented. However, this transformation will not occur automatically: it will depend on institutional conditions, faculty development paths, and the degree of agency instructional designers possess to critically appropriate AI as a tool in service of learning, rather than as a trend imposed by technology.

Conclusions

This research made it possible to analyze the impact of AI tools on university instructional design based on the concrete experience of professionals in Mexico. From the data collected, it is confirmed that the incorporation of AI in this field is neither a marginal nor purely technical phenomenon, but an ongoing process that is

structurally transforming the pedagogical practices associated with the creation of learning experiences.

In line with the proposed hypothesis, the results show that AI has been especially useful for optimizing structured tasks such as drafting objectives, creating resources, generating activities, and developing rubrics. This integration has accelerated processes, improved the initial quality of didactic products, and freed up time for more complex tasks. However, ethical, technical, and pedagogical challenges were also identified, which must be addressed to ensure a responsible, contextualized use aligned with institutional educational models.

One of the most relevant findings is that the appropriation of these tools has been driven mainly by the individual initiative of instructional designers, in contexts with little or no institutional training. This underscores the need to create collaborative spaces for training, dialogue, and reflection, where shared criteria can be developed to integrate AI from a critical pedagogical perspective.

Based on these findings, the following actions are proposed:

- Promote pedagogical training programs in AI, not focused solely on technical use, but on understanding its educational, ethical, and contextual impact.
- Design institutional guidelines and reference frameworks to guide AI use in course design, without limiting the professional autonomy of designers.
- Foster communities of practice among instructional designers, where best practices, useful tools, and common dilemmas in AI use are shared.

In terms of research, this study opens several future lines:

- Conduct comparative analyses of how AI is adopted by teachers and students, in contrast with instructional designers.
- Study the impact of AI use on the quality of learning as perceived by students.
- Evaluate how the systematic incorporation of AI reshapes instructional design models in online education.

In summary, AI represents a significant opportunity to strengthen educational design at the higher education level, but its value will depend on the pedagogical intent with which it is integrated, the conditions that enable it, and the type of professional who accompanies it. Designing with AI not only demands new skills but also new questions, and this study has aimed to open the path toward some of them.

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