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Transforming Teaching and Learning
The Role of Artificial Intelligence in Spanish and Mexican Universities[1]

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1 Introduction: The Role of AI in Transforming Higher Education

The adoption of Artificial Intelligence in higher education has introduced a game-changing phenomenon that significantly transforms the traditions of pedagogy and andragogy. AI offers numerous advantages, including learning personalisation, ease of administration, and accurate pedagogical effectiveness data (Almasri, 2024; Chiu, 2024).

In recent years, significant technological advancements have transformed the learning landscape, with the COVID-19 outbreak necessitating even greater speed for institutions to adapt to new online learning methods. This change necessitates a comprehensive examination of the relationship between AI technology and teaching methods. A significant question arises: how can AI be effectively utilised to bring about the most critical changes in educational outcomes while addressing the ethical concerns and potential issues associated with its use?

The increasing use of generative AI models, such as ChatGPT, has raised significant concerns about academic integrity and the influence on student writing and critical thinking. Recent studies have indicated that a large percentage of students have had access to these AI tools for completing assignments. Therefore, it should be reassessed how far these tools should be implemented in the assessment process within the broader pedagogical framework (Johnston et al., 2024; Ironsi & Solomon, 2025). The study will compare the differences in integrating AI into the curricula of universities in Spain and Mexico. It will focus on the cultural, economic, and institutional factors that influence implementation and effects.

Understanding the differences between Spain and Mexico is crucial for developing targeted strategies that can enhance and modernise education through the effective use of AI. This study is not just theoretical; it aims to inform teachers, policymakers, and other stakeholders about potential ways to enhance the quality of education, enabling both countries to prepare their students effectively for a changing and challenging world. The analysis will provide case studies to illustrate how Spanish and Mexican universities are integrating AI into their curricula. Examining practical implementations and outcomes, researchers strive to develop a comprehensive understanding of how AI can support teaching and learning while addressing its inherent challenges. This is to ensure that higher education institutions

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remain adequate and relevant in a world that is becoming increasingly dynamic due to technological adoption. The above thus makes the issue of AI integration in higher education an urgent one, which is multifaceted and therefore requires due consideration. By focusing on the comparative experiences of Mexico and Spain, this study aims to contribute to the ongoing discourse on the role of AI in education, whether at a practical or theoretical level. Enabling researchers to explore ways in which AI can enhance educational experiences, this paper acknowledges the challenges that accompany its implementation.

2 Theoretical Framework: Lifelong Learning Ecologies and AI Integration

The study stems from learning ecosystems that explore the interplay between structured and casual learning settings, within the realm of educational technology. In learning ecosystems, the focus is put into the different and changing environments where learning takes place. This links educational institutions with casual interactions that are increasingly backed by digital tools (Barron, 2006, 2015).

Universities focusing on education have integrated AI into their websites to significantly improve student experiences across various settings, according to a study by Bastos et al. (2021). They emphasise the importance of experiences and resources shaping students' perceptions of e-learning and suggest that incorporating diverse forms of informal learning, supported by AI, can lead to more effective curriculum design.

Through personalising learning with the use of AI, instructors can create a composite itinerary of diverse activities that keep students engaged in the thinking process and, as a result, foster critical thinking. Additionally, the entry of AI into higher education raises a demand for a shift in teaching methods. Old ways may not adequately prepare students for a workforce that increasingly relies on skills in and with technology, as well as digital literacy. The research findings are backed by the work of Buitrago Ciro and his team. In 2025, progress in intelligence will demand that we adjust to settings that emphasise education and teamwork, enabling individuals to engage in their personal intellectual endeavours. Chiu (2024), in agreement with this perspective, states that the advancement of AI is poised to greatly influence educational approaches by encouraging students to think creatively and innovatively.

The significance of the setting is on the rise in Spain and Mexico due to the expanding use of technology and the continuous advancement of educational frameworks; notable distinctions can be observed in terms of digital proficiency between the education systems of these two countries.

Currently, in the education system, AI is being utilised to enhance students' abilities to align with the job market's requirements. In the field of education, the emphasis is placed on attaining top-tier standards, as mentioned by Dias Trindade and colleagues in 2023. These challenges are hindering the implementation of AI in various settings (Rodriguez Abitia et al., 2020). It is essential to understand how formal and informal learning intersect to comprehend how AI impacts students' learning processes and reflective abilities.

Studies indicate that AI has the potential to support student-centred learning by empowering students to reach their learning capabilities and enhance their critical thinking abilities (Czerkwaskis, 2016). In order to accomplish this goal effectively, it is necessary to create a plan for instruction. A study conducted by Ironsi and Solomon Ironsi (2025) highlights the significance of providing faculty training to empower them in utilising AI tools for improving students' educational journeys. The incorporation of AI in education sparks conversations about intelligence and how people learn on a deeper level. Understanding the effect of AI in education requires recognising how these technologies challenge traditional notions of knowledge and skills. Schiff (2022) emphasises the importance of providing

schools with a framework to integrate AI methods into teaching practices, thereby enhancing quality while upholding academic standards. In both Mexico and Spain, incorporating AI into education within a learning environment has its advantages, with a focus on recognising the importance of AI in educational settings. The analyses suggest ways to enhance teaching and learning in these nations by advocating the use of AI to evolve teaching techniques, for better student readiness in an increasingly digital world.

3 AI Integration in Spain: Innovations and Challenges in Curriculum Design

The use of artificial intelligence has increased in popularity in Spanish education over the past few years. Similar to the University of Barcelona and the Polytechnic University of Valencia, universities have incorporated courses and programs in fields like Data Science, Engineering and Educational Technologies (Coluzzi et al.2024). The National Education Plan for the 21st century supports this endeavor. Corresponds with the EUs mission of improving digital skills, both for students and teachers.

The Spanish Ministry has made the integration of knowledge a priority in the expansion of education; it is augmented in the 'Digital Education Plan 2021-2025'. This represents a strategic alignment with the objectives of European Union countries to enhance the digital literacy of both students and teachers in skills critical for digital mastery.

The pilot projects show promising results: At the University of Granada, an AI-based platform individualises STEM learning by advanced data analysis, boosting engagement and results (Romero-Rodríguez et al., 2023), whilst at the University of Salamanca, administrative chatbots make it easier to access resources and simplify the process by giving quick answers and providing organisational support (Johnston et al., 2024).

Important criticisms, however, persist: regional digital divides limit people's access to infrastructure, devices, and the connectivity needed to fully exploit AI tools, generating disparities in educational options (Rodríguez-Abitia et al., 2010).

4 Evaluating AI in Mexico: Chances and Challenges for Education

Artificial intelligence is now making headway through universities in its early stages, with both advantages and limitations emerging in the process. The Autonomous University of Puebla and the University of Guadalajara are both examining their objectives and resources to integrate AI in fields such as learning and performance evaluation (Romero Rodriguez et al., 2023).

The programme, entitled "Online Mexico", from the government is aimed to improve educational infrastructure and capacity for students as well as teachers, according to the 2021 report from the OECD. However, the lack of institutional integration, insufficient funding, outdated infrastructure and a deficiency of staff training programs that lacked systematic implementation of AI were all listed as hindrances to the implementation of AI (Rodríguez-Abitia et al., 2020). Also, a regulatory system and rules are necessary to preserve the ethics and privacy of student data, as proposed by Morales-Chan et al. (2024). In terms of student experience, there are differences between Mexico and Spain: Mexican students have a greater degree of dissatisfaction, and they demand more practical experience with AI technology, while Spanish students have a higher degree of satisfaction because of their greater opportunity for practical learning ($M = 3.5$, $SD = 0.8$ against $M = 4.2$, $SD = 0.6$).

These findings indicate that Mexican universities should devote more resources to combining AI with the development of educational programs that focus on practical experiences that are relevant to the job

market. These findings would indicate the proper course of action for Mexican universities regarding the integration of AI by creating curriculum that focus on practical, hands-on experiences that are relevant to the job market. The comparative analysis shows that Mexican universities should emulate the most effective practices of their Spanish counterparts. This can be accomplished by decreasing the disparities in creating educational environments, making them more inclusive and participatory. This would facilitate a greater success in the utilisation of education to educate students about the constant evolution of digital worlds.

5 Methodology: A Mixed-Methods Approach of Investigating AI's Impact

Research Design and Data Collection Strategy

The current study has employed a new method of data collection that is intended to determine the degree to which artificial intelligence is incorporated into university curriculum in both Spain and Mexico. This methodology was successful because it blended both quantitative and qualitative results that studied the different effects of AI on education.

The Quantitative section of the study included an online questionnaire to students enrolled in programmes related to the use of AI technology. It was made to measure student perceptions regarding the incorporation of AI, levels of digital literacy, and satisfaction with the elements of practical training in their curricula. The Qualitative Section of the research included interviews conducted with students enrolled in programmes relating to the use of AI technology.

Participant Demographics and Sampling Methods

A total of 200 students took the survey. There were 100 respondents from Spain and an equivalent proportion from Mexico to have a balanced view of both contexts. Participants were selected based on their enrollment in relevant master's programs, including fields such as educational technology, computer science, and digital humanities. The socio-demographic characteristics of the participants are summarised in Table 1.

Table 1. Socio-Demographic Characteristics of Participants

Variable	Spain (n=100)	Mexico (n=100)
Gender	58% Female 42% Male	54% Female 46% Male
Age Range (years)	23-36 M = 27.1	22-35 M = 26.5
Employment Status	55%Part-time 45%NotEmployed	40%Part-time 60%NotEmployed
Field of Study	EducationTechnology:30% Computer Science: 35% Digital Humanities: 35%	Education Technology: 25% Computer Science: 40%, Digital Humanities: 35%

Ensuring the findings relevance to the research questions was achieved by concentrating on students, in AI related degree programs. We collected both numbers and personal stories by conducting interviews with 30 students from each country to understand their encounters, with AI in education. The purpose of this study was to explore students' detailed viewpoints, on how AI influences their learning experiences.

Data Analysis Techniques Employed

The survey's quantitative data were analysed using statistical software SPSS for both descriptive and inferential statistical analysis.

Descriptive statistics will throw some light on major educational variables. Apart from this, independent samples t-test and two-way ANOVA analyses of the basis of the two countries on AI integration satisfaction, digital literacy levels, and practical training alignment will be used to check whether significant differences exist between them. Independent sample t-tests indicated significant differences in the perception of how successful their educational experiences were in preparing them for labor market requirements between Spanish and Polish students. The analysis showed that Spanish students rated their satisfaction with practical training significantly higher than Mexican students did ($t(198) = -4.50$, $p < 0.001$). This finding aligns with the literature, which emphasises the importance of practical experiences in increasing readiness for employment (Almasri, 2024; Bastos et al., 2021). The collected data, from interviews and focus groups, covered a quantitative aspect and were analysed by using a topic-based methodology in order to detect a recurring patterns and themes that show cases of students' interaction with artificial intelligence in an educational context. The process of triangulating quantitative and qualitative data was intended to ensure reliability and validity, this will allow a comprehensive understanding of the way AI is implemented in the educational curriculum of both Spain and Mexico.

The institutional review boards of the participating universities granted ethical clearance, thereby ensuring strict compliance with all existing ethical standards. The anonymity of the respondents and the confidentiality of their responses were also guaranteed to the participants, provided they signed an informed consent form. This allowed the research to be conducted with respect for the ethical behaviour and the rights of the participants, thereby upholding the integrity of the research and demonstrating respect for the participants' rights.

6 Conclusion: Embracing AI for a Transformative Future in Higher Education

The successful integration of artificial intelligence in universities is expected to considerably impact on teaching practices and methods In Spain and Mexico. In Spain's educational system has seen a rise in student happiness and preparedness for job opportunities due to the effective integration of AI, into the curriculum. Spanish universities have devoted the most of their effort to utilizing AI as a teaching method, they have demonstrated that strategic integration can bridge the gap between the theoretical knowledge and its practical application by students. These results are consistent with prior research that argues experiential learning is key to improving employability (Almasri, 2024; Bastos et al., 2021).

The university experiences from Mexico, with particular emphasis, have been extraordinary and have raised key issues during the recent successful implementation of AI. For Mexican students, practical activities have increased, significantly in light of the lack of dedicated AI educational resources.

Technology has to be provided in equal opportunities to provide an inclusive learning setting in order to better equip all students for the challenges associated with the digital world, according to Rodríguez-Abitia et al. (2020).

The impact of AI on higher education also demands a rethink of teaching and learning practices that focus on theoretical knowledge acquisition and practical application. Partnerships between academics, policymakers and technology experts are attempting to build environments which are responsive of the demands placed by the workplace enabling higher education institutions a holistic experience to empower students to take responsibility for their learning. The study underlines on the relevance to consider the application to AI curricula tailored towards specific contexts in Spain and Mexico. This study seeks to advance academic quality curriculum and student results by identifying trade-offs between each system, while also removing barriers to university progress on adapting to future AI challenges. Findings would add greatly to the debate on the impact of AI impact on education and will provide recommendations for educators and Universities about how to incorporate AI effectively in higher education.

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