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Inteligencia artificial en los MOOC: estudio de los perfiles y su potencial socioeducativo

Artificial intelligence in MOOCs: study of profiles and their socio-educational potential

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RESUMEN

En un clima de interés mediático en la inteligencia artificial (IA), de crecimiento de los servicios y aplicaciones asociados a esta tecnología y de intensos debates sobre su uso, la oferta educativa sobre esta temática se encuentra en plena eclosión. En ese sentido, y centrando la atención en los MOOC (cursos en línea masivos y abiertos) se ha observado un crecimiento exponencial de la oferta formativa sobre IA en los últimos años. Esta investigación es parte de una investigación más amplia sobre las dimensiones técnicas y pedagógicas de los MOOC de IA. El objetivo principal de este estudio es conocer el perfil predominante de los MOOC de inteligencia artificial. Con una muestra estadísticamente representativa de 292 MOOC y en base a un sistema de categorías sobre contenidos de IA se lleva a cabo un análisis estadístico descriptivo y factorial de los datos. El análisis concluye que los tres perfiles de MOOC predominantes son: enfocados en la codificación de AI, enfocados en el aprendizaje de AI y enfocados en el valor educativo de AI.

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PALABRAS CLAVE

Inteligencia Artificial; Massive Open Online Courses; perfil de aprendizaje de la IA; perfil de valor educativo de la IA; Educación para una Ciudadanía Digital.

ABSTRACT

In a climate of media interest in artificial intelligence (AI), the growth of services and applications associated with this technology and intense debates on its use, educational offer on this topic are flourishing. In this sense, focusing attention on MOOCs (massive open online courses), an exponential growth of the educational offer on AI has been observed in recent years. This research is part of a broader investigation into the technical and pedagogical dimensions of AI MOOCs. The main objective of this study is to understand the predominant profile of AI MOOCs. Using a statistically representative sample of 292 MOOCs and based on a category system on AI content, a descriptive and factorial statistical analysis of the data is carried out. The analysis concludes that the three predominant MOOC profiles are: focused on AI coding, focused on AI learning and focused on AI educational value.

KEYWORDS

Artificial Intelligence; Massive Open Online Courses; AI learning profile; AI educational value profile; Digital Citizenship Education.

1. INTRODUCTION

The existence of a growing interest in artificial intelligence and its impact on different social and professional facets is reflected in the increase in scientific and media production, opening interesting debates and proposals on its use in the educational context (Delgado-Algarra and Lorca-Marín, 2023, Clarisó, 2024). The media impact of Chat GPT, the popularization of other platforms such as Copilot or Gemini and the emergence of numerous AI-based services for specific tasks that go beyond the merely textual inevitably leads to rethinking the way of working. This rethinking is included in the educational world where, on the basics of TPACK[1] model (Mishra, P., & Koehler, 2006), teachers are faced with the challenge of triangulating the technical knowledge of a technology in continuous change and evolution, the knowledge of the discipline and didactic-pedagogical knowledge if they want to integrate this technology into their professional sphere in an ethical and efficient way, considering this triangulation as a basic aspect in digital citizenship education. According to Richarson, J. & Milovidov (2019), digital citizenship covers several activities such as creating, consuming, sharing, playing, and socializing, to investigating, communicating, learning, and working. Considering this line, a skilled digital citizen can handle both new and everyday challenges regarding education, work, employability, leisure, inclusion, and participation in society (Ferrari, 2013), while respecting human rights and embracing intercultural differences. Regarding these aspects, citizens' approaches depend on different types of AI applications, as well as citizenship and citizenship education, which imply several positions and decisions on participation, assumption of responsibilities, defense of rights, etc. (Delgado-Algarra et al, 2024). On the other hand, the academic and social importance of digital citizenship education is institutionally represented by the fact that on 29 September 2023, at the 26th session of the Council of Europe Standing Conference of Ministers of Education (Council of Europe, 2023), the year 2025 was declared as the European Year of Digital Citizenship Education. In addition to this declaration, the conference included key proposals for education in general and didactics of social sciences in particular such as the launch of the new Council of Europe Education Strategy

[1] Technological Pedagogical Content Knowledge.

2030, a preparatory phase of a European Space for Citizenship Education Framework Convention, a piloting phase of a toolbox for ensuring education rights in emergencies and the start of work on an instrument on the use of artificial intelligence systems in education systems.

Focusing on **Massive Open Online Course (MOOC)**[2], it is a structured unit for learning (course) that allows a high number of students (massive), with a content that can be shared and/or modified (open) and with a design for the autonomous access (online) (Infante-Moro et al., 2017). Considering main trends, xMOOCs and cMOOCs are highlighted (Delgado-Algarra et al, 2019, Delgado-Algarra, 2020): xMOOCs are teacher-based, centralized, unidirectional and behaviorism-based courses with evaluation based on questions, tests, and/or work delivery by students, without interaction between students and cMOOCs are self-organized, networked and connectivism-based courses that are designed under the guidelines of the connective learning of Downes (2012). Essentially, xMOOCs represent the most widespread international MOOC trend. Considering this limitation on users' interaction, studies such as Terras and Ramsay (2015) have highlighted challenges for MOOC developers, including enhancing interaction support, balancing theory with practical examples, providing technical and learning strategy support for students, and facilitating communication among learners and feedback from instructors. Regarding the MOOC platforms, due to the high number of enrolled students in 2012 and on the basics of Stanford technology, Coursera was created by Koller and Yan-Tak and had the support of Michigan, Penn, Princeton, and Yale universities. The same year, Harvard University and the Massachusetts Institute of Technology (MIT) produced the Edx Project.

Considering this study on MOOCs about AI, it is necessary to conceptualize it in general terms. **Artificial Intelligence (AI)** is a technology that consists of algorithms designed to replicate human capabilities in machines. Generally, AI employs computer systems to perform tasks and activities traditionally dependent on human cognition. Advances in computer science are enabling the creation of intelligent machines that closely replicate human reasoning. By leveraging big data, AI utilizes algorithmic machine learning to make predictions, facilitating human-like task execution and decision-making. As the programming, data, and networks that power AI evolve, so does its potential in various industries, including education. According to the 2023 Educause Horizon report (Pelletier et al., 2023), as AI develops more human-like abilities, ethical considerations regarding data usage, inclusivity, algorithmic bias, and surveillance become increasingly significant. Despite these ethical concerns, the application of AI in higher education, particularly in teaching and learning, is expected to grow substantially. Continuing with this report the growing popularity of Artificial Intelligence (AI) and the breakdown of the duality face-to-face and online education stands out the influence of AI on the teaching (creating contents, support in evaluations, etc.) and learning (supporting in specific tasks, facilitating the personalization of learning, etc.).

In formal educational contexts, there are three different approaches to facing the introduction of AI in education (Delgado-Algarra and Lorca-Marín, 2023): prohibition of use, anecdotal use, responsible and critical use. Prohibition of the use of AI is an easier route in the short term, but ignoring the use of this technology is not going to prevent students from using it. Anecdotal and highly controlled use of AI is a first step for those education professionals who are aware of the importance of AI, but who are still somewhat unsure about how to introduce it. From the moment it is decided to introduce it into a learning situation, it is essential to urge students not to blindly trust it, to compare the result and analyze it critically. Finally, educate for a responsible and critical use of AI, which incorporates AI as another teaching resource is the third way and it requires the greatest effort on the part of the teacher because it implies a methodological change and a change in the type of activities that are proposed to the students; however, it is also the one that allows the possibilities of this technology to be efficiently exploited.

Due to the impact AI has on people's lives, the European Parliament (2024) passed the Artificial Intelligence Act on 13 March 2024, in force on 1 August 2024, classifying AI into different regulated

[2] New York Times published an article called "The Year of the MOOC" (Pappano, 2012) that represented the popularity of MOOCs.

categories: unacceptable risk (prohibited, such as social scoring systems or using manipulative techniques), high risk (regulated, such as CV scanning subject to specific legal requirements), limited risk (subject to lighter transparency obligations, such as chatbots and deep fakes), minimum risk (unregulated, including the majority of AI applications). However, the development of AI implies new options active participation and social interaction in educational contexts with some opportunities such as teacher' modeling than support teachers to boost the effectiveness of their didactic activities, multimodal interaction than increase interactivity and feedback for students and teachers, educational robots and empathic systems to encourage students to adopt positive behaviors, and ethical boundaries due to the influence of machines on students, considering (Mohammed and Watson, 2019; Miao et al., 2021). Regarding ethical aspects, according to Lui (2023), some principles of the UNESCO Recommendation on Ethics of AI are balance and harm prevention, protection and safeguarding, equity and not discrimination, sustainability, data protection, human supervision, responsibility, awareness and inclusive and flexible cooperation. Due to the expansion of MOOCs and the development of artificial intelligence (AI) in daily life and as assistive technology for education, this research focuses on IA contents in MOOC environment, highlighting the current profile in the Coursera platform.

2. MATERIAL AND METHODS

The methodological approach of this research is quantitative. Finding a training offer close to 5000 MOOCs on AI in the main MOOC platforms, there are 4696 AI courses only on Coursera. Because of this situation, research focuses on the profile of MOOCs on AI according to information from this platform. Regarding the language, from an international point of view, this research considers only AI courses in English.

Considering platform and language, the population is 1197. With an error percentage of 5%, a deviation of 50% and a confidence level of 95%, to maintain representativeness, a sample size of 292 was defined. According to the problem, a category system is used for data compilation and analysis. This specific block on AI of this category system (table 1) is inspired by several reports and scientific sources such as Pelletier et al (2023) and Mohammed and Watson (2019). Considering this categorization, data is included into the statistical program "SPSS", allowing descriptive analysis and a factor analysis based on correlational methods.

Table 1. Specific Block: Artificial Intelligence.

Subcategory	Indicator
Course Content	AI.CON.01. Algorithmic bias AI.CON.02. Programming AI.CON.03. Analysis AI.CON.04. Machine learning AI.CON.05. Deep Learning AI.CON.06. Human learning AI.CON.07. Ethical questions in data use AI.CON.08. Inclusivity AI.CON.09. Education, teaching and learning

Own elaboration.

Within the descriptive analysis, we will focus on the frequency distribution table, a form of data processing that consists of indicating the cases that share each value of the variable or item; that is, the number of cases that share a given value in each item. Factor analysis, on the other hand, is a multivariate statistical technique of interdependence that analyzes the structure of the interrelationships between many variables without distinguishing between dependent and

independent variables (it assumes that there is a common factor underlying the variables), in order to synthesize them and construct new concepts and theories. Thus, all the covariances or correlations are explained by a series of unobservable random variables (common factors), and any portion of the variance that is not explained by these common factors is considered as residual errors (single or specific factors).

3. RESULTS AND DISCUSSION

3.1. Descriptive analysis

Maintaining a proportionality of 24.39432% with respect to the population and in order to have whole numbers, the criterion of rounding up decimals equal to or greater than 5 and rounding down decimals less than 5 is applied. This proportionality can be seen reflected by topic in Table 2 that includes the number of MOOCs on IA grouped by areas and figure 1 that includes the frequency with percentages by area.

Table 2. Population and samples of MOOCs on IA in relation to different areas.

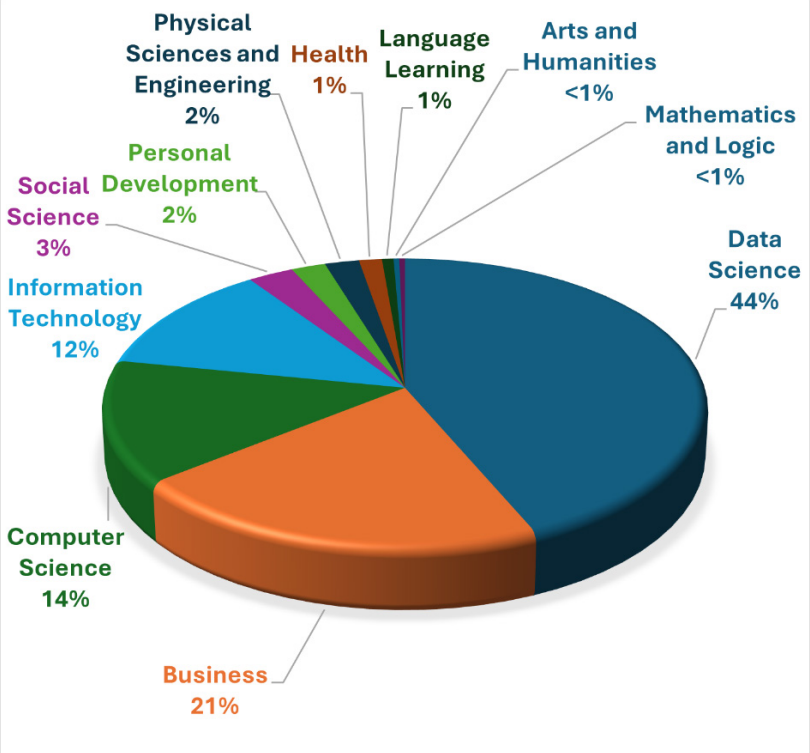
TOPIC	POPULATION	SAMPLE
1. Data Science	519	127
2. Business	250	61
3. Computer Science	164	40
4. Information Technology	147	36
5. Social Sciences	31	8
6. Personal Development	27	6
7. Physical Sciences and Engineering	25	6
8. Health	18	4
9. Language Learning	7	2
10. Arts and Humanities	5	1
11. Mathematics and Logic	4	1
Total	1197	292

Own elaboration.

The area with the highest representation of AI MOOCs is Data Science, accounting for 44%, while the Social Sciences area represents 3%. A large part of the courses focusses on the technical aspects of AI processes. Education would be included in the social sciences section. In scientific dissemination portals such as The Conversation we can find articles about the educational and responsible use of AI (Clarisó, 2024; Delgado-Algarra & Lorca-Marín, 2023). On the other hand, research such as the study by Lan (2024) concludes the importance of aligning teachers' motivations with technological advances and their didactic use, considering it essential to implement the effective use of AI in teacher training. From a broader perspective, Zhai et al. (2021) identified four major trends in the application of artificial intelligence in education during the period 2010-2020:

the Internet of Things (data collection and learning enhancement), swarm intelligence (decentralized AI transforming teacher and student roles), deep learning (large datasets to personalize learning), and neuroscience (understanding the brain to optimize teaching strategies).

Figure 1. Proportion of MOOCs on IA in relation to different areas.



Despite the increasing popularity of AI in scientific and educational research in recent years, MOOCs on artificial intelligence in education do not constitute the majority. In relation to the sample, almost three quarters of the MOOCs analyzed (73.3%) make explicit reference to generative AI, some even include this term in their title. However, almost all the remaining 26.7% of MOOCs are implicitly related to this type of IA. In general terms, the most popular MOOC on AI includes content about machine learning and deep learning (table 3).

Table 3. Mode on contents about AI in MOOC.

	AI.CON.01. Algorithmic bias	AI.CON.02. Programming	AI.CON.03 Analysis	AI.CON.04. Machine learning	AI.CON.05. Deep Learning	AI.CON.06. Human learning	AI.CON.07. Ethical questions in data use	AI.CON.08. Inclusivity	AI.CON.09. Education, teaching and learning
Valid	292	292	292	292	292	292	292	292	292
Lost	0	0	0	0	0	0	0	0	0
Mode	1,00	1,00	1,00	3,00	2,00	1,00	1,00	1,00	1,00

Own elaboration.

Regarding the frequence of MOOC with contents about AI (table 4), **49%** of MOOCs in the sample include content on **algorithmic bias** (AI.CON.01), 22.6% explicitly and 26.4% implicitly. **36,4**% of

MOOCs in the sample include content on **programming** (AI.CON.02), with the same proportion of explicit and implicit presence of such content. **51,7%** of MOOCs in the sample include content on **analysis** (AI.CON.03), 22.9% explicitly and 28.8% implicitly. **36,8%** of MOOCs in the sample include content on **machine learning** (AI.CON.04), 35.6% explicitly and 31,2% implicitly. **66,4%** of MOOCs in the sample include content on **deep learning** (AI.CON.05), 21,2% explicitly and 45,2% implicitly. **52,7%** of MOOCs in the sample include content on **human learning** (AI.CON.06), 14,7% explicitly and 38,0% implicitly. **40%** of MOOCs in the sample include content on **ethical questions on data use** (AI.CON.07), 17,1% explicitly and 22,9% implicitly. **11,6%** of MOOCs in the sample include content on **inclusivity** (AI.CON.08), 1,7% explicitly and 9,9% implicitly. **15,7%** of MOOCs in the sample include content on **education, teaching and learning** (AI.CON.09), 6,8% explicitly and 8,9% implicitly. Considering the frequency, the vision of the most popular contents in the MOOCs in the sample is expanded, having a presence above 50% (both explicit and implicit) and in decreasing order deep learning, human learning and analysis.

Table 4. Frequence of MOOC with contents about AI (grouped).

	Content Not Present		Implicit Content		Explicit Content	
	f.	%	f.	%	f.	%
AI.CON.01. Algorithmic bias.	*149*	*51,0%*	*77*	*26,4%*	66	22,6%
AI.CON.02. Programming.	*186*	63,7%	53	18,2%	53	18,2%
AI.CON.03. Analysis.	141	*48,3%*	84	*28,8%*	67	*22,9%*
AI.CON.04. Machine learning.	97	*33,2%*	91	*31,2%*	104	*33,2%*
AI.CON.05. Deep Learning.	98	33,6%	132	45,2%	62	21,2%
AI.CON.06. Human learning.	138	47,3%	111	38,0%	43	14.7%
AI.CON.07. Ethical questions in data use.	175	59,9%	67	22,9%	50	17,1%
AI.CON.08. Inclusivity.	258	88,4%	29	9,9%	5	1,7%
AI.CON.09. Education, teaching, and learning.	246	84,2%	26	8,9%	20	6,8%

Own elaboration.

Continued with the content about education, teaching and learning, a contingency table with such content and Coursera's classification areas is presented (table 5), it is *implicitly included* on MOOC classified as data science (18/127), business (4/61), social sciences (1/8), personal development (2/6) and health (1/4). On the other hand, that content is *explicitly included* on MOOC classified as data science 13/127), social sciences (4/8), personal development (1/6) and language learning (2/2). Finaly, that content is *not included* in 100% of MOOC classified as computer science (40/40), information technology (36/36), physical sciences and engineering (6/6), arts and humanities (1/1), and mathematics and logic (1/1). In general terms, the content about education, teaching and learning is presented in several areas, but it is not the most popular content on AI.

Table 5. Contingency REF. area. * AI.CON.09. Education, teaching and learning.

REF. area. * AI.CON.09. Education, teaching and learning.		AI.CON.09. Education, teaching and learning.			Total
		Content not present.	Implicit content.	Explicit content.	
REF. area.	Data Science	96	**18**	**13**	127
	Business	57	**4**	0	61
	Computer Science.	40	0	0	40
	Information Technology.	36	0	0	36
	Social Sciences.	3	**1**	**4**	8
	Personal Development.	3	**2**	**1**	6
	Physical Sciences and Engineering	6	0	0	6
	Health	3	**1**	0	4
	Language Learning	0	0	**2**	2
	Arts and Humanities	1	0	0	1
	Mathematics and Logic	1	0	0	1
Total		246	26	20	292

Own elaboration.

3.2. Factorial analysis

The first step is calculating the sample adequacy measure KMO (Kaiser-Meyer-Olkin). KMO quantifies (between 0 and 1) the degree of interrelation between variables, which indicates whether to perform a factor analysis. In this regard, Kaiser, Meyer and Olkin advise the following:

- If KMO ≥ 0.75, performing a factor analysis is a good idea.
- If 0.75 > KMO ≥ 0.5, performing a factor analysis is acceptable.
- If KMO < 0.5, performing a factor analysis is unacceptable.

The smaller the value of the KMO measure, the less the correlations between pairs of variables can be explained by other variables. So, if the value is less than 0.5, factor analysis should not be performed with the sample being worked on. The closer the KMO value is to 1, the more dramatic the data reduction. According to this, the value of KMO in this research is 0,643 (table 6); Moreover, performing a factor analysis is acceptable taking into account that there are only 3 variables (1- content not present, 2- implicit content, 3- explicit content).

Table 6. KMO y prueba de Bartlett.

Medida de adecuación muestral de Kaiser-Meyer-Olkin.		,643
Prueba de esfericidad de Bartlett	Chi-cuadrado aproximado	673,111
	gl	36
	Sig.	,000

Own elaboration.

The following is a simple bivariate Pearson correlation table (r) (table 7) where we will interpret the degree of relationship between pairs of variables according to the magnitude (absolute value) and direction (sign). Pearson's r is a scale that moves between -1 and 0, and between 0 and 1. When the sign is negative the relationship is inverse and when the sign is positive the relationship is direct, and the higher the absolute value, the greater the correlation, which can be low (0.30), medium (0.50), high (0.70) and perfect (1); on the other hand, a correlation lower than 0.30 indicates that we have found some correlation, and in any case it is essential to take into account the degree of significance of any correlation. In this sense, values significant at 0.01 are marked with ** and values significant at 0.05 are marked with *; this means that the probability that the correlation is due to chance is, in the first case, 1% (or less, depending on the value in the table) and, in the second case, 5% (or less, up to 1%, depending on the value in the table). If the probability that the correlation is due to chance is greater than 5%, the correlation is considered not to be statistically significant.

Table 7. Correlation of MOOC content on AI.

Correlations content on AI		AI.CON.01.	AI.CON.02.	AI.CON.03.	AI.CON.04.	AI.CON.05.	AI.CON.06.	AI.CON.07.	AI.CON.08.	AI.CON.09.
AI.CON.01. Algorithmic bias.	Pearson c.	1	,558**	−,132*	,097	,138*	−,159**	−,185**	−,196**	−,199**
	Sig. (bilateral)		,000	,025	,099	,019	,006	,001	,001	,001
	N	292	292	292	292	292	292	292	292	292
AI.CON.02. Programming.	Pearson c.	**,558****	1	−,118*	,170**	,238**	−,197**	−,228**	−,184**	−,188**
	Sig. (bilateral)	,000		,044	,004	,000	,001	,000	,002	,001
	N	292	292	292	292	292	292	292	292	292
AI.CON.03 Analysis.	Pearson c.	−,132*	−,118*	1	−,073	−,106	,011	−,159**	−,177**	−,261**
	Sig. (bilateral)	,025	,044		,214	,072	,846	,006	,002	,000
	N	292	292	292	292	292	292	292	292	292
AI.CON.04. Machine learning.	Pearson c.	,097	,170**	−,073	1	,814**	−,039	−,280**	−,191**	−,137*
	Sig. (bilateral)	,099	,004	,214		,000	,510	,000	,001	,019
	N	292	292	292	292	292	292	292	292	292

AI.CON.05. Deep Learning.	Pearson c.	,138*	,238**	–,106	**,814****	1	–,005	–,339**	–,233**	–,133*
	Sig. (bilateral)	,019	,000	,072	,000		,937	,000	,000	,023
	N	292	292	292	292	292	292	292	292	292
AI.CON.06. Human learning.	Pearson c.	–,159**	–,197**	,011	–,039	–,005	1	,202**	,070	,167**
	Sig. (bilateral)	,006	,001	,846	,510	,937		,001	,232	,004
	N	292	292	292	292	292	292	292	292	292
AI.CON.07. Ethical questions in data use.	Pearson c.	–,185**	–,228**	–,159**	–,280**	–,339**	,202**	1	,377**	,282**
	Sig. (bilateral)	,001	,000	,006	,000	,000	,001		,000	,000
	N	292	292	292	292	292	292	292	292	292
AI.CON.08. Inclusivity.	Pearson c.	–,196**	–,184**	–,177**	–,191**	–,233**	,070	**,377****	1	,446**
	Sig. (bilateral)	,001	,002	,002	,001	,000	,232	,000		,000
	N	292	292	292	292	292	292	292	292	292
AI.CON.09. Education, teaching and learning.	Pearson c.	–,199**	–,188**	–,261**	–,137*	–,133*	,167**	,282**	**,446****	1
	Sig. (bilateral)	,001	,001	,000	,019	,023	,004	,000	,000	
	N	292	292	292	292	292	292	292	292	292

**. The correlation is significant at the 0.01 level (bilateral).
*. The correlation is significant at the 0.05 level (bilateral).

Own elaboration.

The highest average correlations and a high correlation are marked in bold. Low correlations have not been considered. Based on the selected medium and high correlations, all significant at the 0.01 level (bilateral), and considering the factors involved in them, we highlight three profiles of IA MOOC:

- Focused on IA coding.
- Focused on AI learning.
- Focused on the educational value of IA.

The profile of **IA MOOC focused on IA coding** is based on the correlation of algorithmic bias and programming. This is the most technical profile, and it is linked to the creation of instructions for the computer to perform different tasks and the values of humans who are involved in the coding and data collection used to train the algorithm. Regarding this profile, research by Robles-Aguilar et al. (2020) concludes that the most used AI techniques in software testing are Swarm Intelligence, Genetic Algorithms, and Artificial Neural Networks. These techniques are applied to test generation and fault localization, reinforcing the role of AI in improving the efficiency of software testing.

The profile of **IA MOOC focused on IA learning** is based on the correlation of machine learning and deep learning. It corresponds to the highest correlation of this research (0.814**) and is a profile focused on how AI learns and the type of algorithms it uses in each case, either by decision trees (Machine Learning) or by neural networks (Deep Learning).

The profile of **IA MOOC focused on the educational value of IA** is based on the correlation of education teaching and learning, inclusion and ethical questions in data use. This is a more educational, social and ethical profile, close to some of the key aspects highlighted by UNESCO (2021) when referring to an AI for people where it includes issues such as ethics of AI, AI in education or equality. In this sense, UNESCO (2021), in its web space on IA, shows three outstanding tabs that converge with this emerging profile of the factor analysis of this research: ethics on IA, IA in education, and IA & inclusion. AI enables personalized learning, autonomous assessment, and intelligent tutoring. González-González (2023) identifies two trends—deep learning and generative AI—as key drivers of educational innovation, including personalized content creation and educational chatbots. Similarly, he points out two significant challenges: the need to manage large datasets and resistance to change. Within the educational value-centric approach, Zhu et al. (2018) conclude that most studies are quantitative and focused on students, highlighting the need for qualitative research focused on MOOC instructors, whose roles must evolve to develop the full potential of AI integration and its educational value. In the field of inclusive education, AI holds a high potential for personalizing learning. The AI MOOC profile focused on the educational value of IA that emerges from our research converges with approaches such as Zurita et al. (2024) that identify key aspects of AI as a tool for responding to diversity. This approach includes the transformative potential of inclusive education through personalized learning, intelligent tutoring systems, adaptive platforms, and automated assessment tools, while addressing the ethical challenge from a proactive and collaborative perspective to ensure the ethical and equitable implementation of AI in education.

4. CONCLUSION

The media attention and intense debates on the use of IA have generated as many doubts as the need for answers. IA is a revolutionary technology that will force us to rethink our professional practices. This need has driven both the supply and demand for specialized and specific training. MOOCs are part of this training, and IA training is abundant in these training courses. The area with the most representation of MOOCs on AI is Data Science. On the other hand, despite the growth of AI MOOCs in education, MOOCs with technical profiles have a much higher representation in relative terms, still having a low presence in the different areas where these MOOCs are framed.

Based on statistically significant medium and high correlations (at the 0.01 bilateral level) the three IA MOOC profiles were identified.

- AI MOOC focused on AI coding is the most technical profile and it is linked to the creation of instructions for the computer to perform different tasks, including the values of humans who are involved in the coding and data collection used to train the algorithm. The AI MOOC focused on AI learning.
- AI MOOC focused on AI learning include AI's learning processes and algorithm types, such as decision trees (Machine Learning) and neural networks (Deep Learning).
- AI MOOC focused on the educational value of AI link to educational teaching and learning, inclusion, and ethical data use.

The AI MOOC focused on AI coding is the most widespread course profile whereas the AI MOOC focused on the educational value of AI, despite being an emerging profile, has a smaller presence than the other training course profiles. This indicates that, despite the fact that there is training interest in the responsible and inclusive use of AI in education, the training offer on AI aimed at teachers is not on par with the offer for professionals in other disciplines. AI is developing exponentially and has a proven impact on the efficiency and productivity of those who know how to take advantage of its use, in addition to expanding the options for problem solving and for both social and virtual interaction. Due to the importance of this technology and its social and virtual impact, it could be difficult to explain why educators would ignore AI's possibilities and impact on education. AI is not a passing technology; both companies and institutions are investing an enormous eco-

nomic, research and development effort in this technology and multiple forms of use. In addition, reports such as EDUCAUSE have been reporting for years on the importance that AI would come in education. This situation involves the importance of digital citizenship education.

According to this and regarding future lines of research, this research showcases three AI MOOC profiles and reflects different focuses within these courses. This includes thinking about the value of approaches to considering learning needs. In other words, it would be interesting to know the reasons why there is less training on AI for teachers compared to other disciplines and whether this may be conditioned by a lower demand for such training by these teachers. If this is the case, it would be interesting to continue exploring the position of teachers with respect to the professional use of AI for education and what obstacles they face to propose teacher training that connects with their real training needs about the ethical and responsible use of AI from the perspective of different didactics and attention to students with functional diversity.

AUTHORS' CONTRIBUTION

Conceptualization, methodology, formal analysis, investigation, writing—original draft preparation, E.J.D.A.; writing—review and editing, E.J.D.A., J.A.V.R., I.M.P.I. and M.M.P.B.

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