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Perceptions of Artificial Intelligence among Students in the Faculty of Education

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Abstract
Artificial Intelligence (AI) has recently burst into all areas of our lives, and education has not been left behind; however, its accelerated development does not allow research on its didactic use in parallel, even though it is very necessary. This chapter presents an ex-post descriptive study that explored the use of AI among future education professionals, on a sample of 129 students, using an online questionnaire made ad-hoc with 20 items on a Likert scale with four response options. After a descriptive analysis, the results show a disparity of opinions regarding AI, finding benefits such as facilitating the learning or

study of subjects and reducing the time of elaboration of academic work. However, on the contrary, they consider that it reduces creativity, its inappropriate use can produce unfair evaluations, and they do not believe that it improves the knowledge society to a great extent. On the other hand, we found that the use of AI by students is very heterogeneous and involves simple applications. It is therefore necessary to continue research on this concept and its didactic use in the university context of future teachers, and the conclusions offer guidelines on how to do so.

Keywords: Artificial Intelligence, digital competence, higher education, teacher training.

12.1. Introduction

The term Artificial Intelligence (AI) was first used at a conference at Dartmouth in 1956. Later, in the 1960s-70s, the first AI systems with pattern recognition were developed, and the first steps were taken towards natural language processing (NLP). In the 1980s and 90s, advances in information processing and data storage were developed, improving processes linked to machine learning and planning. Between 2000 and 2010, significant advances were made in deep learning and big data analysis, which allowed AI to improve tasks such as image recognition and text generation.

From 2015 to the present, AI has continued to evolve at a rapid pace, with advances in technologies such as reinforcement learning, natural language processing, and robotics (Sanabria-Navarro et al., 2023). As evidenced by the United Nations Educational, Scientific and Cultural Organization (2019), AI has strong potential to accelerate the process of achieving global education goals by reducing difficulties in accessing learning, automating management processes, and optimizing methods that enable improved learning outcomes.

AI offers great potential to improve higher education, from personalizing learning to automating administrative tasks. This tool can help create educational environments that are more efficient, inclusive, and tailored to the individual needs of students (Juca-Maldonado, 2023; Razo-Abundis et al., 2023). Applications using AI are on the rise (e.g., text generators, images, presentations, or videos from prompts) and are becoming common tools for students and teachers. By incorporating this technology

appropriately, higher education institutions can prepare students to meet the challenges of the 21st century and enhance their success in the world of work.

For this reason, the benefits of AI should be harnessed to transform the learning process and improve the quality of education (Cobo et al., 2020). However, it is worth asking ourselves: Do we have sufficient competencies to employ AI? It is important to note that the implementation of AI in education requires careful planning and adequate training for both teachers and students. Wang et al. (2019) indicate that although AI can improve the quality of learning, the lack of understanding and acceptance by teachers and students can be a major barrier to its adoption and effective use in higher education.

AI opportunities in education

AI is currently positioned as one of the emerging technologies with the greatest capacity to revolutionize the educational field (Lengua-Cantero et al., 2020; Veletsianos, 2010). Driven by rapid innovations in informatics and computer science, AI seeks to emulate characteristics of human cognition through the use of algorithms and analysis of large volumes of data. Although it is still far from reaching the complexity of the human intellect, its accelerated development is opening up multiple possibilities for transforming educational processes at all levels of education.

The integration of AI into teaching-learning processes has the potential to optimize various aspects of the educational endeavor through the automation of repetitive tasks, the personalization of content, the prediction of patterns in academic performance, and the harnessing of vast amounts of data to improve decision making (Popenici & Kerr, 2017). Although much of this potential has yet to be validated, expectations are high that these emerging technologies can substantially improve the learning experience for both students and teachers.

Among the most promising uses of AI in training contexts are intelligent tutoring systems and personalized learning environments. Using automated learning algorithms, these systems seek to adapt educational processes to the needs and individual characteristics of each student to make them more efficient and meaningful (Chrysafiadi & Virvou, 2013; Ferreira et al., 2012;

Popescu et al., 2010). While more empirical evidence is needed in this regard, the potential of AI to revolutionize personalized education is undoubted.

AI uses fields such as Machine Learning, Deep Learning and Natural Language Processing (NLP) to ensure that algorithms can learn by themselves and apply their learning in different social and productive contexts (Peñaherrera et al., 2022). That is, they can process, automate, and organize large amounts of data to execute an action and obtain a specific result for the benefit of human beings. Education and the education system are a crucial piece for the development of each person and society in general, which, if combined with AI, allows improving the quality of education and increasing accessibility to education for people with different abilities. This is presented as a constant challenge for everyone, including teachers (Zawacki-Richter et al., 2019).

At this point, it is worth mentioning some elements that stand out for benefiting education from the application of AI, always considering the latent existence of dangers when the aim is to remove responsibility and control with the idea that this new technology could do everything without continuous human supervision.

Through Artificial Intelligence, it is possible to design different virtual platforms that are more user-friendly and interactive to facilitate educational processes, for both the student and the teacher; thus, some institutions are adopting implementations based on instructional design, Learning Management System (LMS) and Artificial Intelligence to interact in synchronous and asynchronous mode with their students (Giró-Gracia & Sancho-Gil, 2022).

However, in the attempt to implement virtual education, these platforms eventually become repositories of texts and videos for the student and teacher to store information, instead of using this medium to promote the construction of learning and dynamic interaction between the student, their peers, the teacher and the contents. It is important to point out that the change is not only technological but also didactic; i.e., it is not a matter of giving the same master class now through a videoconference. The design of activities, contents, resources, evaluations and schedules must be planned for each course and degree based on the objectives and profile of the degree to be achieved. To this end, simulators, forums, problem-solving, debates, and project-based learning, which require continuous interaction among

students but also allow spaces for personal and group reflection, can be used (Jalón-Arias et al., 2022).

The future impact to which AI points is not only related to the didactic and academic scopes but also to the management of attention, control and monitoring of the intention of continuity, performance and dropout of students, and the reasons that lead to decision making, often apparently sudden, but whose analysis displays a complexity built over time that could not be solved due to a lack of support or resources from the academic or institutional staff, in addition to the individual factors of the student (Ocaña-Fernández et al., 2019). Furthermore, in the field of pedagogical diagnosis, through tests and test simulators of video games using virtual reality (AR), the development levels of students in different areas can be evaluated, even adapting the tests to the responses of each subject as the computerized adaptive tests (CAT) did (Burga, 2019), but taking a step further, since it prevents those evaluated from feeling in a stressful situation before a classic test of paper and pencil, reducing inferences and making the experience enjoyable.

Roles and training in AI in higher education

The integration of AI in higher education has implications for faculty members and students. As Arana (2021) argues, AI may allow faculty members to focus on tasks that require human skills, such as social interaction and critical thinking, rather than repetitive and administrative tasks. On the other hand, Patricio et al. (2022) suggest that AI may affect students by allowing them to have more personalized and autonomous learning, which may require greater responsibility for their learning process. In addition, Flores et al. (2021) point out that AI may allow students to have access to learning beyond geographical and time constraints. However, Urretavizcaya-Loinaz (2001) indicates that AI may also replace some traditional roles of faculty members, which may raise concerns about job loss and quality of learning.

Baduge et al. (2022) highlight that implementing AI in higher education requires changing the training and skills of teachers and students to adapt to new technologies. Overall, the implementation of AI in higher education has the potential to change the role of teachers and students, which can generate both benefits and challenges in the learning process.

The lack of teacher training in the use of AI, and especially for its application in innovative teaching strategies, limits the use of AI in education (Chassignol et al., 2018) and makes it difficult for teachers to produce content (Coccia, 2020). It remains a risk for many institutions to change their educational methodology, due to the resistance that can occur when building educational structures with AI, as there is still no volume of good practices that indicate how to incorporate it into teaching (Baduge et al., 2022).

There are more technological developments in industry and communications than related educational practices and experiences (Yang et al., 2021). The incorporation experiences carried out are more concrete actions than planned and continued actions for educational adoption (Alhayani et al., 2021). As can be evidenced in the last year, when ChatGPT was already used by some actors in higher education institutions for assignments and degree projects, the faculty did not know how to work, detect or reconcile its use with the learning objective.

Implementing Artificial Intelligence in education can seem quite a challenge. Therefore, it is important to evaluate the objectives and scope of this digital renewal, as well as the human talent and resource capabilities of the institution. A careful and strategic application of AI will yield better results for students and teachers and improve the institutional image of the educational institution.

12.2. Method

After reviewing the state of the art, the following objective was proposed: to explore the use of AI among future education professionals. To this end, an ex post facto descriptive study was conducted.

A sample of 129 future education professionals from the Faculty of Education Sciences of a Spanish University was accessed through a non-probabilistic and accidental sampling. The vast majority of the respondents (94.6%) were women, with an average age of 21.12 years old; 75.2% were studying a degree in Pedagogy, 17.1% a degree in Early Childhood Education, and 7.8% a master's degree. In terms of year, 42.6% were in their first year, 30.3% were in their second year, 5.4% were in their third year,

15.5% were in their fourth year, and the remaining 6.2% were studying a master's degree.

To meet the research objective, an ad-hoc questionnaire was designed consisting of two blocks: 1) demographic questions (gender, age, year and course), and 2) the questionnaire. This consists of 20 Likert questions with four response options (1 = totally disagree, 2 = partially disagree, 3 = partially agree, 4 = totally agree). The questionnaire was administered online using the Microsoft Forms tool. A Cronbach's Alpha of 0.813 was achieved, which is considered a very good value (Barrios and Cosculluela, 2013, cfdos. in Rodríguez-Rodríguez and Reguant-Álvarez, 2020). Once its reliability was determined, the items were analyzed using relative frequencies.

12.3. Results

The descriptive results of the questionnaire administered using relative frequencies are presented below (See Table 12.1). Firstly, regarding "The use of AI facilitates learning", there was a high degree of agreement. In addition, the participants also agreed that "AI allows me to reduce the time to prepare academic work" and "AI makes it easier for me to study subjects". Therefore, it could be inferred that AI has a great potential to accompany learning in academic environments.

However, 67.4% of the respondents disagreed or partially agreed with the statement "AI encourages my creativity". Likewise, with a similar percentage, 63.6% totally or partially agreed with "The use of AI causes the loss of original ideas", which can be translated as students identifying that creativity can be diminished with the use of AI. On the other hand, with respect to "AI will improve the knowledge society", there is greater dispersion among the students' opinions, with 40.3% of them partially disagreeing and 38.8% partially agreeing.

With regard to "I know how to differentiate truthful information when I use AI", 59.7% of the students totally or partially disagreed with this information, showing a lack of critical appraisal of information. In addition, 80.6% of the respondents totally or partially agreed that "Other colleagues misuse AI", which is one of the teachers' fears about AI. In a similar percent-

age, 77.5% totally or partially agreed that: "The use of AI can promote unfair situations in the evaluation of papers".

Finally, a block of questions can be differentiated with respect to the students' competencies for the use of AI. The tasks with the greatest consensus of agreement among students were "I use AI to summarize or synthesize information", "I can elaborate complete texts or activities using AI", and "I use AI to find information on a topic". In contrast, "I use AI to solve statistical problems", "I have used AI to program applications", and "I am able to create a list of bibliographic references with AI" were the least developed. There was greater dispersion among the items "I am able to design illustrations, such as posters or infographics, using AI", "I can elaborate videos or audiovisual productions with AI", "I can create talking characters with AI", "I translate documents using AI" and "AI helps me to understand teaching explanations". This dispersion could be due to a different background among the surveyed students. In general, students make use of AI to find information and complete tasks, thereby not using the full educational potential of these tools.

Table 12.1. Relative frequencies (%) of the questionnaire items

Items	1	2	3	4
The use of AI facilitates learning.	2.3	17.1	67.4	13.2
AI allows me to reduce the time it takes me to write academic papers.	1.6	7	55	36.4
AI makes it easier for me to study subjects.	7	29.5	48.1	15.5
With AI, my creativity is encouraged.	24	43.4	26.4	6.2
AI will improve the knowledge society.	14	40.3	38.8	7
The use of AI leads to the loss of original ideas.	7.8	28.7	40.3	23.3
I know how to differentiate truthful information when using AI.	12.4	47.3	33.3	7
Another colleagues misuse AI.	6.2	13.2	50.4	30.2
I use AI to find information on a topic.	9.3	16.3	55	19.4
I can produce complete texts or activities using AI.	7	17.8	53.5	21.7
I am able to design illustrations, such as posters or infographics, using AI.	24	18.6	38.8	18.6
I can elaborate videos or audiovisual productions with AI.	27.1	25.6	34.9	12.4

I use AI to summarize or synthesize information.	14	14.7	45.7	25.6
I am able to create a list of bibliographic references with AI.	33.3	40.3	17.8	8.5
I can create talking characters with AI.	38	27.1	27.1	7.8
I translate documents using AI.	26.4	27.9	29.5	16.3
I use AI to solve statistical problems.	42.6	37.2	14	6.2
I have used AI to program applications.	55	33.3	7.8	3.9
AI helps me to understand teaching explanations.	24	31	33.3	11.6
The use of AI may promote unfair situations in the evaluation of jobs.	8.5	14	51.9	25.6

12.4. Conclusions

Below, we share some recommendations that could be useful for using AI in higher education:

- Understand the needs and preferences of the students: It is important to use AI in a way that fits personal needs and preferences. This involves knowing their level of familiarity with technology, their learning styles, their interests, and their level of digital competence in order to select and customize AI tools.
- Provide training and support: It is essential to ensure that faculty members and students are trained in the use of AI. This requires identifying their needs and, based on them, proposing an appropriate training system to familiarize them with the various tools available and to understand how to integrate them effectively into the teaching-learning process.
- Evaluate the quality of AI tools: It is important to evaluate the quality and reliability of these tools before using them in the classroom. This involves researching and selecting those that are supported by scientific evidence and meet data security and privacy standards.
- Continuously monitor and adjust the use of AI: It is essential to continuously monitor and evaluate the impact of the use of Artificial Intelligence in the classroom. This involves analyzing data and obtaining feedback from students to identify areas for improvement and adjust AI integration accordingly.
- Promote ethics and accountability in the use of AI: It is critical to ensure that tools are being used ethically, protecting the

privacy of student data and promoting an equitable and transparent relationship with technology.

- Encourage active student participation. AI can be used to encourage active student participation in the learning process. For example, through online collaboration tools or automatic feedback, students can be encouraged to participate in classes and interact with the content actively.
- Personalized learning: AI allows adapting the content and teaching methodology to the needs and preferences of each student. It is important to use tools that allow learning to be personalized, providing resources and activities that match students' learning styles, interests and skill levels.
- Fostering creativity and innovation: AI can be used to foster creativity and innovation in both students and teachers. For example, through AI-based content generation tools, creativity can be stimulated, and innovative ideas for projects and assignments can be generated.
- Include social-emotional aspects in AI-based activities: The inclusion of social-emotional aspects is essential to ensure a holistic and comprehensive approach to student learning. While AI can be a valuable tool for academic support, it is also important to recognize that education is not only about acquiring knowledge but also about developing social-emotional skills and emotional well-being.
- Include ethical aspects in AI-based activities: The inclusion of ethical aspects when using AI is critical to ensure that its implementation is responsible and benefits everyone involved. AI has great potential to transform the way learning and teaching take place, but it also raises ethical challenges and concerns in terms of privacy, bias, fairness and transparency.

In order to integrate AI developments into the educational environment and benefit from their contributions, creating more efficient, inclusive educational environments adapted to the individual needs of students (Juca-Maldonado, 2023; Razo-Abundis et al., 2023), it is necessary to identify the previous knowledge of both faculty and students.

This chapter shows a first approximation of the knowledge and valuations of the latter. However, it must be completed with the view of faculty members, who, as stated by Wang et al.

(2019), may constitute a barrier to the implementation of AI in Higher Education depending on their knowledge and level of acceptance of technologies, in general, and AI, in particular.

Furthermore, as specified in the recommendations, it is urgent to open an internal debate in the faculties and initiate processes of reflection (Jalón-Arias et al., 2022) and generation of ethical codes for the use of AI, as well as to increase training in the use of anti-plagiarism software capable of detecting those productions made with this technology. In this way, the risks identified by the students in our sample could be reduced.

Finally, identifying, validating, and analyzing every AI application for education and its integration, taking into account its rapid development, are proposals for new research that should not be delayed.

References

Alhayani, B., Mohammed, H. J., Chaloob, I. Z., & Ahmed, J. S. (2021). The effectiveness of Artificial Intelligence techniques against cyber security risks applies to the IT industry. *Materials Today: Proceedings, 531.* http://dx.doi.org/10.1016/j.matpr.2021.02.531.

Arana, C. (2022). Inteligencia artificial aplicada a la educación: achievements, trends and perspectives. *INNOVA UNTREF. Revista Argentina de Ciencia y Tecnología, 1*(7). https://bit.ly/3HcGF9U

Baduge, S. K., Thilakarathna, S., Perera, J. S., Arashpour, M., Sharafi, P., Teodosio, B., & Mendis, P. (2022). Artificial Intelligence and smart vision for building and construction 4.0: Machine and deep learning methods and applications. *Automation in Construction, 141*, 104440 https://doi.org/10.1016/j.autcon.2022.104440

Burga León, A. (2019). Applications of technology to psychometric assessment. *Purposes and Representations, 7*(SPE), e318. http://dx.doi.org/10.20511/pyr2019.v7nSPE.318

Chassignol, M., Khoroshavin, A., Klimova, A., & Bilyatdinova, A. (2018). Artificial Intelligence trends in education: a narrative overview. *Procedia Computer Science, 136*, 16-24. https://doi.org/10.1016/j.procs.2018.08.233

Chrysafiadi, K., & Virvou, M. (2013). Student modelling approaches: A literature review for the last decade. *Expert Systems with Applications, 40*(11), 4715-4729. https://doi.org/10.1016/j.eswa.2013.02.007

Cobos, M., R-Moreno, M., & Barrero, D. (2020). R2P2: a robotic simulator for teaching Artificial Intelligence. *Proceedings of the Conference on University Teaching of Computer Science*, (5), 285-292. https://bit.ly/48pJ7pA

Coccia, M. (2020). Deep learning technology for improving cancer care in society: New directions in cancer imaging driven by Artificial Intelligence. *Technology in Society*, *60*, 101198. https://doi.org/10.1016/j.techsoc.2019.101198

Ferreira, A., Salcedo, P., Kotz, G., & Barrientos, F. (2012). The arquitecture of ELE-TUTOR: An intelligent tutorial system for Spanish as a foreign language. *Signos Estudios de Lingüística*, *45*(79), 102-131. https://doi.org/10.4067/S0718-09342012000200001

Flores, F. A., Capuñay, D. L., Estela, R. O., Valles, M. Á., Vergara, E. E., & Elera, D. G. (2021). Artificial Intelligence in education: a review of the literature in international scientific journals. *Apuntes Universitarios*, *12*(1), 353-372. https://doi.org/10.17162/au.v12i1.974

Giró-Gracia, X., & Sancho-Gil, J. M. (2022). Artificial Intelligence in education: Big data, black boxes, and technological solutionism. *Revista Latinoamericana de Tecnología Educativa*, *2*(11), 129-145. https://doi.org/10.17398/1695-288X.21.1.129

Jalón-Arias, E. J., Molina-Chalacan, L. J., & Culque-Toapanta, W. V. (2022). Artificial Intelligence as an accelerator for the creation of teaching resources in higher education. *Conrado Journal*, *18*(S3), 8-14. https://bit.ly/3NZbNNR

Juca-Maldonado, F. (2023). The impact of Artificial Intelligence on academic work and research papers. *Metropolitan Journal of Applied Sciences*, *6*(S1), 289-296. https://bit.ly/48ohQnb.

Lengua-Cantero, C., Bernal-Oviedo, G., Flórez-Barboza, W., & Velandia-Feria, M. (2020). Emerging technologies in the teaching-learning process: Towards the critical thinking development. *Revista Electrónica Interuniversitaria Interuniversitaria de Formación del Profesorado*, *23*(3), 83-98. https://doi.org/10.6018/reifop.435611

Ocaña-Fernández, Y., Valenzuela-Fernández, L. A., & Garro-Aburto, L. L. (2019). Artificial Intelligence and its implications in higher education. *Propósitos y Representaciones*, *7*(2), 536-568. http://dx.doi.org/10.20511/pyr2019.v7n2.274

Peñaherrera, W., Cunuhay, W. C., Nata, D. J., & Moreira, L. E. (2022). Implementation of Artificial Intelligence (AI) as an educational resource. *Scientific Journal World of Research and Knowledge: Recimundo*, *2*, 404-413. https://doi.org/10.26820/recimundo/6.(2).abr.2022.402-413

Popenici, S., & Kerr, S. (2017). Exploring the impact of Artificial Intelligence on teaching and learning in higher education. *Research and Practice in Technology Enhanced Learning, 12*(1), 1-13. https://doi.org/10.1186/s4103901700628

Popescu, E. Badica, C., & Moraret, L. (2010). Accommodating learning styles in an adaptive educational system. *Informatica (Slovenia), 34*(4), 451-462. https://bit.ly/3SbJrlS

Razo-Abundis, Y., Dibut-Toledo, L. S., & Morales-Navarro, N. G. (2023). UGC plus platform: lifelong learning. *Revista UGC, 1*(2), 5-12. https://bit.ly/3NU1bjb

Rodríguez-Rodríguez, J., & Reguant-Álvarez, M. (2020). Calculating the reliability of a questionnaire or scale using SPSS: Cronbach's alpha coefficient. *REIRE Revista d'Innovació i Recerca en Educació, 13*(2), 1-13. https://doi.org/10.1344/reire2020.13.230048

Sanabria-Navarro, J. R., Silveira-Pérez, Y., Pérez-Bravo, D.-D., & Cortina-Núñez, M. D. (2023). Incidences of Artificial Intelligence in contemporary education. *Comunicar: Scientific Journal of Communication and Education, 31*(77), 97-107. https://doi.org/10.3916/C77-2023-08

United Nations Educational, Scientific and Cultural Organization (2019). *How Artificial Intelligence Can Strengthen Education.* UNESCO. https://bit.ly/3ROiVxJ

Urretavizcaya-Loinaz, M. (2001). Intelligent systems in the field of education. Inteligencia artificial. *Revista Iberoamericana de Inteligencia Artificial, 5*(12), 5-12. https://bit.ly/47Ai4qs

Veletsianos, G. (2010). Emerging Technologies in Distance Education. Marquis Book.

Wang, S., Yang, D. M., Rong, R., Zhan, X., Fujimoto, J., Liu, H., Minna. J., Wistuba. I. I., Xie, Y., & Xiao, G. (2019). Artificial Intelligence in lung cancer pathology image analysis. *Cancers, 11*(11), 1673. https://doi.org/10.3390/cancers11111673.

Yang, S. J., Ogata, H., Matsui, T., & Chen, N. S. (2021). Human-centered Artificial Intelligence in education: Seeing the invisible through the visible. *Computers and Education: Artificial Intelligence, 2*, 100008. https://doi.org/10.1016/j.caeai.2021.100008.

Zawacki-Richter, O., Marín, V.I., Bond, M. et al. (2019). Systematic review of research on Artificial Intelligence applications in higher education. Where are the educators? *International Journal of Educational Technology in Higher Education, 16*(1), 1-27. https://doi.org/10.1186/s41239-019-0171-0