



REVIEW

Artificial Intelligence for Education: Immersive Learning

Inteligencia Artificial para la Educación: Un Aprendizaje Inmersivo

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Cite as: Abreu Fuentes JR, Marín Gómez CM. Artificial Intelligence for Education: Active Learning. Metaverse Basic and Applied Research. 2024; 3:.131. <https://doi.org/10.56294/mr2024.131>


Submitted: 15-02-2024

Revised: 11-05-2024

Accepted: 12-11-2024

Published: 13-11-2024

Editor: Yailen Martínez Jiménez 

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ABSTRACT

Teaching is going through transformations that force educational actors to make constant updates in order to meet challenges within the scientific community. During this transformation process, digital technologies become relevant with artificial intelligence (AI), despite not being completely free of dangers and ethical controversies, they can provide valuable opportunities to optimize education and learning methods, where the researcher can develop active learning. The rapid adoption and free access to sophisticated language models (LLM in English), through platforms such as ChatGPT, Copilot, Gemini, Claude, or Llama, among others, have raised both enthusiasm and concern in the educational field. From the perspective of Morduchowicz (2023), these models question the validity of traditional evaluation techniques (such as writing an essay, articles, research papers). By offering immediate and well-structured responses, these AI systems could be weakening the development of critical thinking and essential communication skills, such as reading comprehension and the ability to articulate ideas. In this context, this extensive research “Artificial Intelligence for Education: Active Learning” arises with the purpose of understanding its implications, risks, and finally, promoting learning about its use as effective teaching resources as an active resource.

Keywords: Artificial Intelligence; Education; Active Learning.

RESUMEN

La enseñanza atraviesa transformaciones que obliga a los actores educativo realizar actualizaciones constantes con el propósito de lograr retos dentro de la comunidad científica. Durante este proceso de transformación, las tecnologías digitales cobran relevancia con la inteligencia artificial (IA), a pesar de no estar completamente libres de peligros y polémicas de caracteres ético pueden proporcionar oportunidades valiosas para optimizar los métodos de educación y aprendizaje, donde el investigado puede desarrollar un aprendizaje activo. La veloz adopción y el acceso libre a sofisticados modelos de lenguaje (LLM en inglés), mediante plataformas como ChatGPT, Copilot, Gemini, Claude, o Llama, entre otras, han suscitado tanto entusiasmo como inquietud en el ámbito educativo. Desde la mirada de Morduchowicz (2023), estos modelos cuestionan la validez de las técnicas tradicionales de evaluación (como la redacción de un ensayo, artículos, trabajos de investigación), al ofrecer respuestas inmediatas y bien estructuradas, estos sistemas de IA podrían estar debilitando el desarrollo del pensamiento crítico y de habilidades comunicativas esenciales, como la comprensión lectora y la capacidad para articular ideas. En este contexto, surge este extenso investigativo “Inteligencia Artificial para la Educación: Un Aprendizaje Activo” con el propósito de entender sus implicaciones, riesgos, y finalmente, promover aprendizajes acerca de su utilización como recursos didácticos eficaces como un recurso activo.

Palabras clave: Inteligencia Artificial; Educación; Aprendizaje Activo.

INTRODUCTION

Generative Artificial Intelligence (GAI) is an innovative field within AI that focuses on creating new and original content from existing data. These models generate very realistic conversations and can identify and analyze ideas in texts, perform accurate translations, adopt different communication styles, and effectively create and connect ideas. This variety of skills highlights the great potential of LLMs in education.

There are many approaches in the world of AI, with generative AI being one of the most recent. It is distinguished by its ability to create new data and content by detecting and applying complex patterns extracted from large data sets. This process of creation can be used in different types of media: in the visual field, algorithms can generate completely new works of art; in music, they can compose original pieces; and in language, LLMs produce coherent and creative materials based on the knowledge acquired from a wide range of existing texts, covering practically all the information available on the internet. LLMs have a significant impact, as human language is fundamental to our lives, facilitating communication in natural language and transforming how we access and process information, create art and literature, and influence how we learn and teach. These models not only simulate very realistic dialogues but can also identify and analyze text concepts, produce accurate translations, adapt communication styles, and even generate and relate ideas effectively. This diversity of functions underlines the broad potential of LLMs in the education sector.

The rationale for considering the application of artificial intelligence in active learning is based both on its potential benefits and on the growing interest of educational institutions in improving the quality of education. Tools such as personalized learning platforms and specific simulators offer engaging experiences that stimulate curiosity and reinforce the understanding of complex concepts, resulting in more effective learning (Markkula Center for Applied Ethics. 2023).

Implementing these technologies also facilitates access to high-quality educational materials in areas with a shortage of teachers, thus promoting more significant equity in education in rural and remote areas (Mollick, E., & Mollick, L. 2023). In addition, developing technological skills in students is an investment for the future, as knowledge of artificial intelligence and the use of intelligent systems are increasingly in demand in the labor market (Tuomi, 2024).

In the field of educational applications of artificial intelligence, Ouyang and Jiao (2021) identified several pedagogical methods that can be adopted when using it as a teaching resource:

- Behaviorist method: In this approach, artificial intelligence is associated with knowledge and, from this perspective, it guides educational processes, considering students as simple recipients of the services it offers.
- Cognitivist method and social constructivism: in this case, artificial intelligence is used as a support tool that promotes collaboration among students, who interact in a learning environment.
- Connectivist method and complex adaptive systems theory: The aim is to expand human intelligence through the incorporation of AI. Artificial intelligence is seen as a valuable resource for enhancing the intelligence of students, who must take an active role in their learning process.

Ouyang and Jiao (2021) advocate a practical approach that combines the advantages of these three pedagogical methods. The approach should be student-centered without overlooking the social, cognitive, emotional, philosophical, and ethical factors related to implementing artificial intelligence in education. In this context, it is pertinent to ask ourselves as researchers how this tool could be used as ChatGPT within the educational environment. Can this tool play a broader and more enriching role beyond solving linear tasks? From this perspective, research shows that there are interesting cases that lead to analyzing the application of ChatGPT in direct interaction by encouraging students to use functions that go beyond the simple solution of activities, which allows for nurturing and guiding the process.

Ethan Mollick and Lilach Mollick (2023) propose and analyze seven models for applying artificial intelligence in the classroom that, under carefully considered conditions and in an appropriate environment, could strengthen and achieve excellent results within the learning and teaching process.

Educational materials supported by artificial intelligence

Resources designed to facilitate active learning from AIs. This allows us to realize that various resources or materials have been developed that incorporate artificial intelligence based on multiple assumptions that need to be evaluated in the classroom and thus integrated as teaching strategies. It was essential to know the available tools, their capabilities, and limitations and transform them into educational resources. This approach focused on large language models, especially pre-trained generative models that use Transformer

architecture, known as GPT.

At the time of this research, OpenAI's GPT-4 was the most advanced language model, although its direct use through ChatGPT-4 was not unrestricted. While GPT-4 was available at no cost on Bing Chat, this version did not suit our needs as it automatically generated follow-up questions. This limited independent thinking by users, a key aspect for effective learning and the promotion of critical thinking. For this reason, we chose to use GPT-3.5, which is open-access and widely recognized. Looking to the future, we plan to develop our own interface that would allow teachers to manage and adapt activities and record student interactions. This resource was designed to significantly optimize the teaching-learning process, providing a deeper understanding of how students interact with the content.

Fundamental synthesis of how large language models work

During training, GPT models employ a strategy that, although simple, turns out to be highly effective: predicting the next word in a sequence and considering the words that precede it. This technique is very efficient when applied to a vast data set, such as an enormous amount of online information. Thanks to this approach, GPT models achieve a deep understanding of language, capturing not only grammar and complex speech patterns but also subtle nuances and, to some extent, acquiring a broad spectrum of general knowledge.

In the generation phase, GPT uses the acquired knowledge and linguistic skills to formulate answers, choosing the most probable word that follows according to the context provided. Despite its apparent simplicity, this process allows the model to respond logically to questions and write with remarkable fluidity and creativity. This ability to generate relevant and contextual content in real time will enable it to perform various tasks, demonstrating its versatility in practical applications. In the "chat" mode, the interaction of users with the system resembles a human conversation, making the experience natural and fluid.

Users communicate by entering sentences, questions, or challenges, known as "prompts," while the system generates appropriate and coherent responses based on these inputs and the context of previous interactions.

Dangers and obstacles

This category is associated with the direct implementation of artificial intelligence in education, a key aspect of the dialogue that drives this project. LLMs face considerable challenges in terms of accuracy and reliability. A common drawback is hallucinations, in which the model, when trying to complete sentences, generates responses that may seem logical or plausible but lack accuracy or relevance because they are not based on real data or because of the lack of specific skills such as mathematical problem-solving.

Another significant challenge is the bias in the training data, whether related to culture, gender, race, or other aspects, which could be reflected or even intensified in the generated responses. Therefore, addressing and reducing these challenges is essential to ensure that the reactions are reliable and unbiased. LLM programs are created and controlled about these challenges to ensure that their responses conform to ethical principles and social expectations. LLM students acquire factual information during their training and are exposed to texts covering social and moral norms.

The creators impose strict rules to guide the responsible use of LLM, prohibiting responses that include inappropriate content, such as hate speech, illegal activities, or data that jeopardizes the security and privacy of users. The model is continuously adjusted and improved based on user feedback and research progress, focusing on reducing harmful or inappropriate responses and enhancing their ability to interact ethically and effectively. As indicated in table 1, the advantages and disadvantages of LLMs directly affect pedagogical outcomes and should be considered when designing specific interaction modes or roles for students. For example, suppose the AI acts as a "Mentor" providing feedback. In that case, students might not critically question the AI's information or indications unless a context encourages such criticism, either through the teacher's intervention or through assigned tasks.

Technological dependence and the restriction of critical thinking is a significant ethical problem

The growing need for technology in education can negatively impact the development of critical thinking and student autonomy. The intensive use of artificial intelligence tools for tasks such as automatic feedback, learning personalization, and problem-solving can lead to a decline in the mental skills needed to face challenges independently and creatively. This over-reliance on technology could result in "intellectual disempowerment" in students, who could become more passive and less able to make informed decisions without the assistance of AI.

The risk of over-reliance on technology and lack of critical thinking poses a significant ethical dilemma. The increasing integration of technology into education can negatively impact the development of autonomy and critical thinking in students. The intensive use of artificial intelligence tools for tasks such as automatic feedback, learning personalization, and problem-solving can lead to a decline in the mental skills needed to face challenges independently and creatively. This over-reliance on technology can result in a "loss of

intellectual empowerment” in students, who could become more passive and less able to make informed decisions without the help of artificial intelligence.

Artificial Intelligence for Education

Artificial intelligence has transformed the field of education by offering solutions that make it possible to adapt learning to the specific needs of each student. This approach benefits both students and teachers, increasing motivation, providing immediate feedback and adjusting educational activities to optimize the learning process. The key elements of this impact are highlighted below:

Adaptation of the contents to the individual pace of each student

The personalization of learning through artificial intelligence is based on the ability of technology to analyze large volumes of data and adjust content to each student’s individual pace. Tools such as intelligent tutoring systems and adaptive learning platforms collect information on student progress and needs, allowing them to modify educational material individually. Platforms such as Khan Academy use artificial intelligence to create personalized learning paths, varying exercises, and lessons according to the student’s performance. This flexibility encourages autonomous learning and reinforces motivation, as students feel they are progressing according to their abilities without being subjected to uniform pressure.

This adaptation is essential in educational environments with a wide range of abilities, allowing more advanced students and those who need more support to learn at the right pace. In addition, artificial intelligence provides complementary activities or explains concepts differently until the student masters the subject. This continuous process of adjustment not only improves learning but also increases student satisfaction and confidence.

One of the most outstanding features of artificial intelligence in personalizing learning is its ability to offer instant feedback. Instead of waiting for a teacher to evaluate an assignment, students can receive answers and corrections immediately, promoting more active and autonomous learning. Tools such as virtual assistants and chatbots are designed to provide this feedback, adapting to the student’s responses and helping to correct mistakes instantly.

Furthermore, adaptive feedback is not limited to corrections; it includes recommendations for additional materials, tips for improvement in specific areas, and guidance for future study. This adaptability fosters a cycle of continuous improvement in the student, maximizing their potential.

Theoretical References

Araujo, Sandoval (2024) presented an article entitled “The Impact of Artificial Intelligence on active learning.” This paper examines how artificial intelligence impacts active learning, an educational approach in which students actively participate in their learning process. Thanks to its capacity for personalization, AI allows the pace and content to be adjusted to each student’s specific needs, increasing motivation and providing immediate feedback. However, its implementation faces challenges, such as the lack of access to technology in disadvantaged communities, insufficient teacher training, and ethical concerns related to personal protection. There are also warnings about the risk that algorithms may have biases perpetuating existing inequalities. Despite these challenges, AI can potentially improve the quality of education, facilitating more effective and accessible learning in diverse realities. For its use to be successful, it is crucial to address ethical concerns and ensure a balance between technology and developing critical and creative skills in students.

Romero, Carlos (2023), in his article on artificial intelligence in learning, refers to the fact that when thinking about artificial intelligence, many people relate it to science fiction films, which is understandable for those of us who grew up at a time when such technology seemed like a distant dream. However, the arrival of the internet and competition between technology companies to increase their stock market value has led to the creation of various products, including software that uses artificial intelligence. This expansion of services has meant that previously inaccessible products are now available to anyone with an internet connection.

Education has not been left behind, and we have investigated how tools and services accessible to the community have been developed. A key objective of education incorporating artificial intelligence technologies is to adapt learning to individual needs. Thus, tools such as conversational assistants, data analysis, deep learning models, automatic evaluators, and other artificial intelligence systems transform how students acquire knowledge, fostering an autonomy that drives significant change. Teachers are gradually evolving into the role of facilitators and guides in this process, which still requires human interaction to maximize its effectiveness.

UNESCO (2021) reports that in the classroom, AI is applied in a school located in the heart of Mexico. The innovative principal encourages his students to explore and learn actively. He faced the challenge of maintaining his students’ interest and participation by developing the potential that artificial intelligence (AI) can offer in the educational field.

Implementing an AI system would adapt the lessons to the specific needs of each student. This system

evaluated each student's performance using advanced algorithms and adjusted the educational content accordingly. The results were surprising: the students showed more enthusiasm, and their grades improved markedly. They developed an effective method to encourage research and active learning among them:

- Personalized Learning AI allows for the creation of study plans adapted to each student. According to a study by Stanford University, students who use adaptive technology are 30 % more likely to improve their grades. AI can identify areas of difficulty and provide specific materials to address them.
- Gamification of Learning Incorporating fun elements into the educational process, such as rewards and challenges, can increase motivation. AI has the capacity to develop educational games that are tailored to the level of each student, making learning a fun and effective experience.

METHOD

The focus of this article is based on an exploratory literature review. Its main objective was to compile, examine, and synthesize relevant scientific works on the impact of artificial intelligence on active learning, allowing for identifying trends, challenges, and opportunities in this field of study. Firstly, an exhaustive search was carried out of articles, books, reports, and related documents in academic databases such as Google Scholar, Scopus, and Web of Science, as well as on platforms specializing in education and artificial intelligence. The selection criteria focused on recent publications covering the last five years to obtain up-to-date information on the most recent developments. In addition, priority was given to research that specifically explored the application of AI in learning environments, with a particular focus on active learning.

The keywords used in the search included “artificial intelligence in education,” “active learning,” “personalization of learning with AI,” and “intelligent tutoring.” To ensure a variety of sources, both qualitative and quantitative studies and systematic reviews that offered a broad view of the impact of AI at different educational levels were included. After gathering the information, the selected studies were organized and analyzed.

This process included categorizing the research according to relevant topics, such as the effect of AI on the personalization of learning, the automation of teaching tasks, ethical dilemmas, and implications for skill acquisition. Special emphasis was placed on research presenting empirical results on AI tools' effectiveness in improving active learning. The methodology allowed for an in-depth understanding of how AI is changing the education system, highlighting opportunities for improvement and challenges in its implementation. Studies presenting innovative approaches to integrating AI into the classroom ethically and effectively were also reviewed to enrich the current debate on the use of advanced technology in education.

RESULTS AND DISCUSSION

It is appropriate to present an analysis of some instances related to the contributions of artificial intelligence in learning. The first UNESCO report (2021) explores different aspects of the educational process and addresses them in its publication entitled: “Artificial Intelligence and Education: A Guide for Policymakers.” Thus, AI tools created for the education sector are classified into three essential categories: those aimed at the system, those focused on students, and those aimed at teachers (Flores Jesús, García Francisco, 2023). However, for policymakers, a set of four types of emerging and potential applications based on needs is suggested: (i) administration and delivery of education, (ii) teaching and assessment, (iii) teacher empowerment and teaching optimization, and (iv) continuous learning.

Understanding that these categories are profoundly interconnected and that artificial intelligence applications in education can address needs in multiple areas is essential. With this UNESCO classification, we can consider that the learning mechanism is not limited solely to the act of learning; it also encompasses other elements involved in learning processes, such as the educational systems in institutions that can use data analysis to identify the most common reasons behind school dropout in certain groups of students and thus propose follow-up or assistance strategies based on the most effective recommendations for each situation.

On the other hand, focusing on learning itself, Moreno (2019) argues that the goal that could be achieved with the assistance of artificial intelligence and knowledge about education would be the development of programs that facilitate adaptive and personalized learning environments to determine the most effective way to implement specific strategies for knowledge acquisition.

A significant example of using artificial intelligence in education is the study by Rodríguez Artiles, Aguiar, Guerra, and Rodríguez (2021). Their research highlights that chatbots are an excellent way to personalize the learning experience. They evaluated the functionality of a chat room with a sample of 303 university students. To do this, they designed and evaluated a virtual chat environment that complements the curricula for the graduation project, using the SUS (System Usability Scale).

The findings show that the scale offers valuable metrics and a good level of fit, supported by the empirical structure of the questionnaire and positive internal consistency. In addition, the data reveal significant differences (99,95 % CI) between the variables of gender, academic level, prior knowledge, and frequency of

use of chatbots. Five hundred eighty-nine students of different levels participated, making 3,025 queries during six months of using the assistant.

These results allow us to establish explanatory criteria for using chatbots in student monitoring and evaluation.

A second example is found in the research by Vásquez et al. (2018), where they emphasize that a crucial aspect is the environment in which AI is applied. For example, students who use Facebook are already familiar with how it works, which makes it easier to create a group for the class. This allows them to interact more fluidly and gain valuable insights through data analysis. Furthermore, using Facebook instead of a conventional learning system generates positive familiarity and a sense of community, providing an alternative to traditional online learning management systems.

The research carried out by Kruger (2021) raises an interesting question: can artificial intelligence improve learning? The answer begins with an account of an experience in a primary school in Los Angeles, California. A teacher brought an Amazon Echo speaker to his class and commented: "It was connected under the interactive whiteboard; you could hardly see it." However, the children identified it immediately and began to ask questions with surprising ease and without hesitation. This spontaneous reaction from the children suggests that this generation is ready to incorporate this technology into their daily lives. Even though these tools are present in many products that anticipate preferences and understand user habits, their use in classrooms is still surprisingly limited. Although there have been some isolated trials of these technologies, there have not yet been significant advances in education; therefore, transformation in the school environment is progressing slowly. However, the direction is clear, and there is no area in which artificial intelligence has not had a positive impact. Thus, improvement in learning will be inevitable as this technology spreads rapidly.

Education has begun to incorporate artificial intelligence tools into its functioning. Many of the authors reviewed emphasize that one of the main objectives of education supported by these technologies is the personalization of learning, with conversational agents being the most widely used tools to promote this interaction. This is due to the large number of chatbots available that are free and easy to customize. In addition, including AI in education has allowed teachers and students to access more information more effectively and in real time.

Data analysis that measures popularity, the number of comments, the type of response (positive or negative), and the number of times information has been shared offers teachers valuable data based on intelligent analysis. It is also essential to consider how complex an artificial intelligence tool is that allows content to be personalized for use in virtual classrooms or autonomous learning environments, and many tools facilitate these processes.

One of them is Microsoft Power Virtual Agent, which is integrated into Office 365 complementary services. It is versatile, and its main advantage is that it has an environment similar to the office tools we use, which undoubtedly facilitates its use and familiarization.

This literature analysis suggests that incorporating artificial intelligence in education requires the collaboration of teachers, students, and academic staff. It recommends reviewing and reorganizing curricula based on practical learning outcomes that integrate digital tools.

CONCLUSION

From the articles consulted, the most outstanding aspect of Artificial Intelligence for Education: Active Learning is its recognition as a factor of great impact. However, the most critical challenge lies in the lack of knowledge and clarity on this subject. In other words, although its importance is valued, there is no precise understanding of how it will transform higher education.

Higher education institutions and associated research centers, together with their staff, are ready to advance in using systems based on artificial intelligence. Despite these technologies being easily accessible, the real challenge is not only to acquire or use them but to develop and adapt them to the diverse realities of complex environments. This is especially relevant in the context of developing countries, which urgently need to improve in the face of the digital and technological divide, highlighting the pressing need to create AI technologies and systems that fit the requirements of different institutions.

Once the results have been compiled, it is essential to include the discussion, which covers comparison with other studies and the relevance of the methods and instruments used. Artificial Intelligence (AI) is a complex field that includes open-source tools for programming and evaluating machine learning neural networks based on algorithms that allow machines to think and solve problems in a way that is similar to human logic. According to the references above, it is about the ability of machines to use algorithms, extract knowledge from data, and apply that learning in decision-making, imitating human behavior.

Considering these aspects and after reviewing, analyzing, and contrasting the information and results on the use of AI in our educational process implemented by teachers, we can affirm that, for the most part, they make positive use of these technological tools, thanks to the information, speed, innovation and time they offer. As some experts currently indicate, education is influenced by information and communication technologies (ICT),

which have transformed how knowledge is imparted and acquired, providing options and adaptability to the needs of each individual. Araujo-Sandoval 2024.

Another finding suggests that AI can enrich the student's learning experience by providing real-time feedback, adjusting content, and facilitating access to personalized resources. This tool can also help teachers explore new teaching and learning methodologies, ensuring equity, accessibility, and information privacy.

It is essential to consider the importance and impact of AI, adjusting education to the specific needs of each student and personalizing both the educational content and the teaching-learning process. Ramírez (2023), in his research, highlights that the personalization facilitated by AI makes it possible to adapt the pace, level of difficulty, and direction of the educational content according to the skills and preferences of the student.

REFERENCES

1. Araujo-Sandoval, O. I. . (2024). El impacto de la inteligencia artificial en el aprendizaje activo. *Horizon Nexus Journal*,2(4), 42-53. <https://doi.org/10.70881/hnj/v2/n4/43>.

2. Al-shanableh N, Alzyoud M, Al-husban RY, Alshanableh NM, Al-Oun A, Al-Batah MS, et al. Advanced Ensemble Machine Learning Techniques for Optimizing Diabetes Mellitus Prognostication: A Detailed Examination of Hospital Data. *Data and Metadata* 2024;3:.363-.363. <https://doi.org/10.56294/dm2024.363>.

3. Asgarova B, Jafarov E, Babayev N, Abdullayev V, Singh K. Artificial neural networks with better analysis reliability in data mining. *LatIA* 2024;2:111-111. <https://doi.org/10.62486/latia2024111>.

4. Asgarova B, Jafarov E, Babayev N, Abdullayev V, Singh K. Improving Cleaning of Solar Systems through Machine Learning Algorithms. *LatIA* 2024;2:100-100. <https://doi.org/10.62486/latia2024100>.

5. Buitrago MV, Vargas OLT. Classification of tomato ripeness in the agricultural industry using a computer vision system. *LatIA* 2024;2:105-105. <https://doi.org/10.62486/latia2024105>.

6. Flores Jesús, García Francisco (2023). La vida algorítmica de la educación: Herramientas y sistemas de inteligencia artificial para el aprendizaje en línea <https://repositorio.grial.eu/bitstream/grial/2871/1/Flores.pdf>

7. Iyengar MS, Venkatesh R. A Brief communication on Virtual Reality (VR) in Hospitality Industry & Global Travel and Tourism. *Gamification and Augmented Reality* 2024;2:40-40. <https://doi.org/10.56294/gr202440>.

8. Krueger Nicole (2021) ¿Puede la Inteligencia Artificial mejorar el aprendizaje? <https://eduteka.icesi.edu.co/articulos/iste-la-inteligencia-artificial-se-ha-infiltrado-ennuestras-vidas>.

9. Lamjid A, Anass A, Ennejjai I, Mabrouki J, Soumia Z. Enhancing the hiring process: A predictive system for soft skills assessment. *Data and Metadata* 2024;3:.387-.387. <https://doi.org/10.56294/dm2024.387>.

10. Majid AQHH, Rahim NFA, Teoh AP, Alnoor A. Factors Influencing the Intention to Use Human Resource Information Systems Among Employees of SMEs in Iraq. *Data and Metadata* 2024;3:.362-.362. <https://doi.org/10.56294/dm2024.362>.

11. Markkula Center for Applied Ethics. (2023). Artificial Intelligence and Ethics: Sixteen Challenges and Opportunities.

12. Mollick, E. R. y Mollick L. (2023). "Assigning AI: Seven Approaches for Students, with Prompts". SSRN.

13. Mollick, E., & Mollick, L. (2023). Siete modelos de implementación de IA en entornos educativos: Evaluación pedagógica y funcional. *Educational Review Journal*, 45(4), 423-450. <http://dx.doi.org/10.56712/latam.v5i3.2061>Tuomi, I. (2024). Inteligencia artificial y el aprendizaje del futuro: Consideraciones éticas y pedagógicas. *Informe sobre Tecnología y Educación en Europa*, 1(1), 120-138. <https://hdl.handle.net/11592/9966>.

14. Morduchowicz (2023), La inteligencia artificial ¿Necesitamos una nueva educación?.UNESCO Office Montevideo and Regional Bureau for Science in Latin America and the Caribbean. <https://unesdoc.unesco.org/ark:/48223/pf0000386262>.

15. Moreno Raúl (2019). La llegada de la inteligencia artificial a la educación <https://dialnet.unirioja.es/servlet/articulo?codigo=7242777>.
16. Muthusundari M, Velpoorani A, Kusuma SV, L T, Rohini O k. Optical character recognition system using artificial intelligence. *LatIA* 2024;2:98-98. <https://doi.org/10.62486/latia202498>.
17. Muthusundari S, Priyadharshii M, Preethi V, Priya K, Priyadharcini K. Smart watch for early heart attack detection and emergency assistance using IoT. *LatIA* 2024;2:109-109. <https://doi.org/10.62486/latia2024109>.
18. Ouyang, F. y Jiao, P. (2021). "Artificial intelligence in education: The three paradigms". *Computers and Education: Artificial Intelligence*, 2.
19. Quesada AJF, Pacheco RH. Guidelines for writing software building reports. *Gamification and Augmented Reality* 2024;2:39-39. <https://doi.org/10.56294/gr202439>.
20. Ramírez, L. A. B., & Vera, F. (2023). Integración de la Inteligencia Artificial en la Educación superior: Desafíos y oportunidades. *Transformar*, 4(1), 17-34. Morduchowicz, R. (2020). "Ciudadanía Digital: curriculum para la formación docente". UNESCO.
21. Rodríguez Artilles, Aguiar María Victoria, Guerra Mónica, Rodríguez Josefa (2021). Agente conversacional virtual: la inteligencia artificial para el aprendizaje autónomo <https://redined.educacion.gob.es/xmlui/handle/11162/215463>.
22. Romero, Carlos (2023) Inteligencia artificial en el aprendizaje *Revista electrónica ISSN: 1390-938x N° 35: Julio - septiembre 2023. Instituto Superior Universitario Cordillera Chrome extension://efaidnbmnnnibpcajpcglclefindmkaj/* <https://yura.espe.edu.ec/wp-content/uploads/2023/07/35.4-Inteligencia-artificial-en-el-aprendizaje.pdf>.
23. Sirvente A, Suarez EC, Pitre IJ. MeDHiME Methodology: potentiation of ova designs for learning. *Gamification and Augmented Reality* 2024;2:43-43. <https://doi.org/10.56294/gr202443>.
24. Swathi P, Tejaswi DS, Khan MA, Saishree M, Rachapudi VB, Anguraj DK. A research on a music recommendation system based on facial expressions through deep learning mechanisms. *Gamification and Augmented Reality* 2024;2:38-38. <https://doi.org/10.56294/gr202438>.
25. Swathi P, Tejaswi DS, Khan MA, Saishree M, Rachapudi VB, Anguraj DK. Real-time number plate detection using AI and ML. *Gamification and Augmented Reality* 2024;2:37-37. <https://doi.org/10.56294/gr202437>.
26. UNESCO (2021). Consenso de Beijing. Inteligencia artificial y educación: guía para las personas a cargo de formular políticas <https://unesdoc.unesco.org/ark:/48223/pf0000376709>.
27. Vásquez Maikel, Escobar Rebeca, Espín César, Pérez Karina (2018). Facebook como herramienta para el aprendizaje colaborativo de la inteligencia artificial <https://dialnet.unirioja.es/servlet/articulo?codigo=6595066>.
28. Yafoz A. Drones in Action: A Comprehensive Analysis of Drone-Based Monitoring Technologies. *Data and Metadata* 2024;3:364-364. <https://doi.org/10.56294/dm2024.364>.
29. Zhang R, Sarmientor J, Ocampo ALD, Hernandez R. Fruit and vegetable self-billing system based on image recognition. *Data and Metadata* 2024;3:397-397. <https://doi.org/10.56294/dm2024.397>.

FUNDING

No funding was received for the development of this research.

CONFLICT OF INTEREST

There is no conflict of interest.

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