ISSN 1886-5895
Julio 2023 Nº 69
https://usie.es/supervision21/
https://doi.org/10.52149/sp21

INTELIGENCIA ARTIFICIAL APLICADA A LA EDUCACIÓN: EL FUTURO QUE VIENE

ARTIFICIAL INTELLIGENCE APPLIED TO EDUCATION: THE UPCOMING FUTURE

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Resumen

La inteligencia artificial (IA), lleva varias décadas implementándose en nuestra sociedad. Tanto es así, que tenemos asumidas sus aplicaciones en ciertos campos de la vida cotidiana, como la automatización de procesos productivos y empresariales, tecnologías de la información y comunicación, marketing y publicidad, atención al cliente y diagnósticos médicos, etc. Al igual que ocurre con otras innovaciones, la esfera educativa sigue unos patrones de asimilación más lentos. La evolución en la incorporación a nivel educativo de las TIC (Tecnologías de la Información y la Comunicación), TAC (Tecnologías del Aprendizaje y el Conocimiento), TEP (Tecnologías del Empoderamiento y la Participación) y TRIC (Tecnologías de la relación, Información y Comunicación), tiene una consecuencia lógica: la aplicación de la inteligencia artificial en las aulas en el futuro más próximo. En este artículo analizaremos algunos aspectos clave de la introducción de la inteligencia artificial en el contexto escolar,

Recepción: 16/05/2023 Aceptación: 13/07/2023

valorando posibilidades y posibles riesgos. También analizaremos el papel de la IA en el marco metodológico del Diseño Universal para el Aprendizaje (DUA), así como su utilidad en la atención al alumnado con necesidad específica de apoyo educativo, finalizando con una mirada hacia los retos, límites éticos y posible futuro de la IA en el ámbito educativo.

Palabras clave: *inteligencia artificial, Diseño Universal para el Aprendizaje, atención a la diversidad, alumnado con necesidad específica de apoyo educativo, tecnología educativa, inspección educativa, calidad educativa, funciones ejecutivas, metodologías activas, innovación educativa*.

Abstract

Artificial Intelligence (AI) has been implemented in our society for several decades to such an extension that we have assumed as common its applications in certain fields of daily life, like the automation of production and business processes, information and communication technologies, marketing and advertising, customer service and medical diagnoses, and more. As other innovations, the field of education follows slower assimilation patterns. The evolution of the incorporation of ICT (Information and Communication Technologies), LKT (Learning and Knowledge Technologies), ETP (Empowerment and Participation Technologies) and RIC (Relationship, Information, and Communication) at the educational level has a logical consequence: the application of artificial intelligence in the classroom in the very near future. In this article we will analyze some key aspects of the introduction of artificial intelligence in the school context, assessing possibilities and possible risks. In this article we will analyze some key aspects of the introduction of artificial intelligence in the school context, assessing possibilities and possible risks. We will also analyze the role of AI in the Universal Design for Learning (UDL) methodological framework, as well as its usefulness in serving students with a

Recepción: 16/05/2023 Aceptación: 13/07/2023

specific need for educational support, ending with a look at the challenges, ethical limits, and possible future of AI in education.

Keywords: artificial intelligence, Universal Design for Learning, attention to diversity, students with specific needs for educational support, educational technology, educational inspection, educational quality, executive functions, active methodologies, educational innovation.

1. APPROACH TO THE CONCEPT OF ARTIFICIAL INTELLIGENCE

The birth of artificial intelligence can be traced back to the 1950s, when a group of researchers and scientists began exploring the idea of creating machines that could think and learn in a similar way to humans. One of the early milestones in the development of artificial intelligence was the program called Logic Theorist, developed by Allen Newell and Herbert Simon in 1955. This program used a system of logical rules to solve complex mathematical problems and is considered the first artificial intelligence program capable of proving mathematical theorems. In the 1960s, the term "artificial intelligence" began to be used more frequently, and researchers continued to develop new algorithms and programs to solve a wide variety of problems, from language processing to pattern recognition and decision-making in various fields. Between 1970 and 1980, artificial intelligence experienced a surge in popularity and interest, particularly in the business sector. Companies began to utilize artificial intelligence to optimize production and improve worker efficiency. Expert systems were developed to assist in decision-making across various fields. Starting in 1980, artificial intelligence made significant advancements in multiple aspects, thanks to the development of computer information processing capabilities and the complexity of algorithms and machine learning techniques. Among the notable milestones in the evolution of artificial intelligence during this period, we highlight:

1980-1990: During this decade, significant advances were made in the creation of expert systems, which were computer programs designed to mimic the decision-

Recepción: 16/05/2023 Aceptación: 13/07/2023

making of a human expert in a specific field. Expert systems were used in applications such as medicine, engineering, and business management.

1990-2000: During this decade, artificial intelligence began to be applied to more complex programs such as speech recognition and computer vision. Deep learning algorithms were also developed, such as convolutional and recurrent neural networks, which enable AI systems to learn from large datasets.

2000-2010: During this period, significant advances were made in robotics and the ability of artificial intelligence systems to interact with the physical world. Robots capable of performing complex tasks, such as walking on uneven terrain, were developed. Additionally, artificial intelligence systems capable of understanding natural language and engaging in conversations with humans were created.

2010-2020: In the last decade, artificial intelligence has experienced an unprecedented boom thanks to the development of deep learning techniques and the increase in available data. Artificial intelligence systems have been used in a wide range of applications, from facial recognition to autonomous vehicle driving. There has also been a surge in the use of artificial intelligence in industries, medicine, and other fields, including applications in the education.

Today, we understand artificial intelligence as the ability of a machine to perform tasks that require human intelligence, such as reasoning, perception, decision making, language comprehension and learning processes themselves. But can a machine learn? There are different approaches to developing artificial intelligence, but one of the most popular is machine learning, which involves the use of algorithms and mathematical models for machines to learn from data and improve their performance with experience. Artificial intelligence has been used in a variety of applications from virtual assistants and recommender systems to autonomous robots and medical diagnostics. Machines with artificial intelligence can learn and adapt as they interact with the world. There are different types of AI, the so-called weak artificial intelligence focuses on specific tasks following fixed patterns of data detection (widely used in financial fraud detection). There is also the so-called strong artificial intelligence, which seeks to develop systems

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that can match or even surpass human intelligence in a wide variety of tasks. Artificial intelligence is based on complex mathematical algorithms and models that are run on computers to perform tasks. These algorithms can be trained and tuned to improve machine accuracy and performance. Machine learning and natural language processing are two artificial intelligence tasks that have advanced significantly in recent years and have found practical applications in a wide variety of fields such as medicine, security, manufacturing, customer service and marketing, among others.

But what is an artificial intelligence algorithm? We can define it as a sequence of logical and mathematical instructions that an intelligence program follows to carry out a specific task. It is the basis of any artificial intelligence system. AI algorithms are created by scientists and software developers using machine learning techniques, neural networks, and other advanced data processing methods. These algorithms are designed to process large amounts of data and learn from it to improve their performance and accuracy in performing specific tasks. AI algorithms can be supervised or unsupervised. Supervised algorithms use previously labeled training data to learn how to perform a specific task, such as classifying images or recognizing natural language. On the other hand, unsupervised algorithms use unlabeled data to find patterns and relationships in the data and learn from them. These algorithms are used in a wide variety of applications, including speech recognition, facial recognition, language processing, data analysis and automated decision making. Creating an artificial intelligence algorithm requires several steps: collecting and preprocessing data, choosing a machine learning model (decision trees, neural networks, SVM, etc.), implementing the model with subsequent training on the collected data, evaluating the model, tuning the model, and implementing it.

2. ARTIFICIAL INTELLIGENCE AND EDUCATION

In the field of education, talking about artificial intelligence means going beyond the incorporation of technology in the classroom. It involves leaving in the hands

Recepción: 16/05/2023 Aceptación: 13/07/2023

https://doi.org/10.52149/Sp21
ISSN 1886-5895

of machines certain tasks that were usually performed manually or with very limited technology. In this progression of the incorporation of AI in the educational field, it has begun with more mechanical tasks (such as processing a considerable volume of data for student admission processes or statistical analysis of the same), to use it in more didactic tasks, ranging from the treatment of curricular content to more complex ones that require advisory or decision-making processes by the machine itself. The following are some of the applications of AI in the field of education:

- Educational data analysis: large amounts of educational data, such as student grades, teacher profiles, scores for selection or admission procedures, etc., can be analyzed through AI. This, in addition to administrative aspects, allows educators to identify patterns and trends in student performance and to customize instruction to meet student needs.
- Speech and handwriting recognition: speech and handwriting recognition tools use artificial intelligence algorithms to transcribe students' speech and handwriting. These tools can be used to evaluate students' written work and provide real-time feedback. Early applications of these programs have been used with neurodivergent students with visual and/or motor impairments, allowing them to interact with learning content through these tools. An example of this was the Dragon Dictate system, developed in the 1980s, which allowed users to dictate text instead of typing it. Today, artificial intelligence has evolved into voice assistants, which allow spoken interaction without the need to type questions into a computer or use a search engine where the answers are provided in written form. Among the most popular voice assistants are applications such as Siri, Google Assistant, Alexa, or Cortana. In the educational field, the use of these voice assistants is not widespread, although they can be a very effective tool for resolving students' doubts, searching for information, or even suggesting activities adapted to their own cognitive and learning profile. If we analyze the trends in this field, we can say, without falling into futuristic predictions, that artificial intelligence chatbots, will be in the not too distant future, a personalized

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tutoring tool for students, because with proper programming of their algorithms, may be able not only to provide information about any event or occurrence in record time, but also to provide tasks graded by difficulty according to the profile of the students accessing this service, even adapting their way of interacting to possible personal characteristics (students with dyslexia, ASD, ADHD, dyscalculia, etc.). One of the first intelligent tutoring systems was developed in the 1970s by the University of Illinois to teach mathematics to college students. In addition, speech and/or handwriting recognition systems can analyze student responses and provide real-time feedback. This can be especially useful in assessing repetitive tasks and providing continuous feedback to the student body.

- Another application of artificial intelligence that has long been used commercially is recommender systems. At the educational level, these systems use artificial intelligence algorithms to analyze user behavior patterns and provide personalized recommendations such as books, articles, and other learning resources based on learners' preferences and reading history. In addition, AI can also be used to create personalized educational content tailored to learners' needs.

Many universities also use artificial intelligence to detect plagiarism, as well as question classification systems, whose algorithms are used to generate banks of questions classified by difficulty and degree of complexity, which helps professors to select those most appropriate for certain profiles or professional competencies.

- Another AI educational application is online learning platforms, which use artificial intelligence technology to tailor learning to the individual needs of each student. These platforms collect data on student performance and use this information to adapt content and activities according to the needs of each user.

Finally, apart from the apps mentioned above, there are a multitude of programs that include artificial intelligence and can be applied to the educational field. Some of them, such as FaceApp or Prisma, are image editors capable of modifying the appearance of a person based on given patterns or transforming a

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photo into a work of art inspired by great painters. The possibilities of these tools are as wide as the ability of teachers to use them in a didactic way. In this sense, our educational system contemplates a methodological framework that not only accommodates multiple forms of action and expression, but also includes it as a firm commitment. We are referring to the model based on the Universal Design for Learning (UDL) which we develop below.

3. UNIVERSAL DESIGN FOR LEARNING (UDL) AND ARTIFICIAL INTELLIGENCE

Organic Law 3/2020, of December 29, amending Organic Law 2/2006, of May 3, on Education, introduces important changes, many of them derived, as indicated by the law itself in its explanatory memorandum, from the convenience of reviewing the measures provided for in the original text in order to adapt the educational system to the challenges of the 21st century, in accordance with the objectives set by the European Union and UNESCO for the decade 2020-2030. In accordance with this approach, the preliminary title of the new text of the Organic Law 2/2006, of May 3, on Education, incorporates among the principles and purposes of education the effective fulfillment of children's rights as established in the United Nations Convention on the Rights of the Child, educational inclusion, and the application of the principles of Universal Design for Learning. On the other hand, Royal Decree 157/2022, of March 1, establishing the organization and minimum teachings of Primary Education, in its article 5, dedicated to the general principles, establishes in its point 4 that "the organizational, methodological and curricular measures adopted for this purpose shall be governed by the principles of Universal Design for Learning". Likewise, article 21, dedicated to the autonomy of the centers, states in point 2 that the educational administrations must contribute to the development of the curriculum "favoring the elaboration of open models of teaching programs and didactic materials that meet the different needs of students and teachers, under the principles of Universal Design for Learning". Also in its Annex III, dedicated to learning situations, it is stated that for the acquisition of competencies to be optimal, learning situations must be well

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contextualized and respectful of the students' experiences and their different ways of understanding reality. Regarding the learning situations, the regulations emphasize that they must specify and evaluate the students' learning experiences and must be composed of tasks of increasing complexity, according to their psycho-evolutionary level, thus promoting the construction of meaningful learning. In this regard, the principles of Universal Design for Learning provide a methodological framework that allows for adapting to the unique learning needs and rhythms of all students.

Regarding Compulsory Secondary Education, Royal Decree 217/2022, of March 29, which establishes its organization and minimum teachings, establishes in Article 20, referring to students with special educational needs, that "the educational administrations will establish the conditions of accessibility and universal design, as well as human and material support resources that facilitate access to the curriculum for students with special educational needs". As it happens in primary school, article 26 of RD 217/2022, contemplates as part of the autonomy of the centers, the elaboration of curricular proposals based on the UDL. Royal Decree 243/2022, of April 5, which establishes the organization and minimum educational requirements for Baccalaureate, in its Annex III, states that, for an adequate acquisition of competences, the learning situations presented to students must align with the principles of Universal Design for Learning, since this approach allows offering contextualized learning experiences respectful of the different ways of understanding reality. In Baccalaureate, it is essential that instructional processes allow for the construction of new learning and prepare students for their personal, academic, and professional futures. The aim of these learning situations is to offer students the opportunity to connect and apply what they have learned in real-life contexts. As we can see, the normative foundation of UDL outlines an educational landscape where we need to consider multiple planes and perspectives when designing instructional processes. In this scenario, the role that artificial intelligence can play is extensive. To get an idea of the dimensions of this proposal, let's break down each principle of UDL and relate the

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guidelines of each principle to the possibilities offered by AI. The first step is to define the three principles on which UDL is based and the guidelines that make up each of them:

PRINCIPLES OF UNIVERSAL DESIGN FOR LEARNING

PRINCIPLE 1: Provide multiple forms of representation.	**PAUTA 1:** Facilitate the perception of information. **PAUTE 2:** Facilitate the decoding of language and symbols. **PAUTE 3:** Facilitate the comprehension of the content.
PRINCIPLE 2: Provide multiple forms of action and expression.	**PAUTA 1:** Facilitate the use of different spaces and materials for accessing and processing information: keyboards, touch screens, accessible software, etc. **PAUTA 2:** Propose options for expression and communication such as **active methodologies** that use multiple media: text, voice, drawings, film, music, movement, art, etc. **PAUTA 3:** Encourage the exercise of **executive functions.**
PRINCIPLE 3: Provide multiple forms of forms of involvement.	**PAUTA 1:** Use strategies and resources to capture interest. **PAUTE 2:** Provide options to maintain effort and perseverance. **PAUTE 3:** Encourage self-regulation.

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We will now show some applications of artificial intelligence to each of these principles:

PRINCIPLE 1, guideline 1 "Facilitate the perception of information": artificial intelligence can be very useful in facilitating the perception of information to students with programs that allow changing the size of text, font or font type, measuring the contrast between background, text and image, using color as a means of information or to highlight some element or varying the volume or speed with which sound or written information is presented. It can also offer alternatives for auditory information (use subtitles, use diagrams, graphics, provide written transcriptions of videos or audio documents, as well as offer alternatives for visual information (use text-speech descriptions in images, graphics, and videos, use 3D spatial models, provide auditory cues for main ideas, convert digital text (PDF) to audio, etc.).

PRINCIPLE 1, guideline 2 "Facilitate the decoding of language and symbols": If in the previous guideline we referred to the importance of providing students with multiple ways of perceiving the curricular content, this guideline refers to the importance of facilitating the proper decoding of the language or symbols through which the content to be learned is expressed. In this way, artificial intelligence can help the learner to understand the vocabulary and symbols being used, facilitate the decoding of texts, mathematical notations, and symbols (showing lists of terms or keywords, or accompanying the text with digitized voice). In addition, meaning and phonetic translators are an essential tool for decoding language in other languages or even in the student's own language, in the case of students with alterations in these processes.

PRINCIPLE 1, guideline 3 "Facilitate the comprehension of the content": Once the student has perceived the information and decoded it, the next step is the adequate comprehension of the message. To do this, prior knowledge must be activated, which will allow linking what the student already knows with the new material to be learned, establishing significant links between the two that will allow the realization of meaningful learning. To this end, AI can help clarify the

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syntax and structure of texts, establishing relationships between elements, for example, through concept maps, connections with previous structures, highlighting transition words in a text, linking main ideas, and illustrating them through multiple media (images, movement, tables, videos, photography, 3D simulations, etc.). Chatbots can also provide specific support, break up the information, adapt it to the evolutionary and cognitive level of the learner, time the content, provide techniques and tools for memorizing the content, as well as for self-assessment (templates, checklists, etc.).

PRINCIPLE 2, guideline 1 "Encourage the use of multiple spaces and materials": When we think of educational spaces, we usually visualize real rooms of a center where teaching and learning processes usually take place (classrooms, laboratories, playgrounds, library, assembly hall, etc.), but increasingly, the use of virtual spaces as didactic and pedagogical tools is being incorporated into teaching. For example, it is very common to find virtual reality simulators in vocational training, especially for distance and blended learning modalities. But the applications of these simulated spaces go much further. Through artificial intelligence, we can access learning environments with a level of reality that allows students to literally walk through a city, a museum, enter the human body or visit ancient Greece. There are a multitude of products on the market aimed at providing this type of experience, such as: Microsoft Hololens, Oculus Quest, Oculus Quest 2, HTC Cosmos, and others in development, such as Intel's Project Alloy, Qualcomm and Google's Daydream Standalone, or Samsung's Exynos VR. Regarding materials, the list of technologies that are being introduced in educational centers is very long (digital whiteboards, computers, tablets, projectors, mobile devices, computer applications, etc.) and their use is increasingly becoming part of the daily life of the centers. So much so that a multitude of concepts have emerged and continue to emerge that refer to the incorporation of these electronic tools and their different applications. We are talking about concepts such as ICT (Information and Communication Technologies), LKT (Learning and Knowledge Technologies), EPT (Empowerment

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and Participation Technologies) or RIC (Relationship, Information and Communication Technologies), which, in short, represent the process that has been followed in the incorporation of new technologies in the educational field. The use of these concepts will depend on where the use of these technologies is oriented (obtaining information, learning, participation, teamwork, etc.).

PRINCIPLE 2, guideline 2 "Use of active methodologies": We understand by active methodologies the set of procedures, techniques and instruments that generate motivating learning situations and allow students to interact with peers and teachers, producing learning at multiple levels (curricular, social, emotional, intellectual...), to achieve significant learning not only in terms of knowledge acquisition, but also in the development of executive processes.

Artificial intelligence has a strong presence among the many examples of active methodologies in a multitude of gamifications through computer applications or computer games. Thus, games such as Quick, draw or programs such as Learning ML, Machine Learning for kids, Teachable Machine, Artificial Intelligence Camera, Stable Diffusion, Dalle-2, or Clip Interrogator, among others, confront students with challenges of different kinds, from generating texts, images, programming the operation of a robot or creating their own artistic productions, all interacting with artificial intelligence for purely educational purposes. Other active methodologies that are often used in classrooms, such as ABP (Project Based Learning), ABR (Challenge Based Learning), AS (Service Learning), without being directly linked to the use of AI, can provide opportunities to train students in processes of search and analysis of information, categorization, synthesis, and application of the same. In the case of MUAM (Methodologies that Use Artistic Media), artificial intelligence offers a wide range of possibilities, especially in terms of computer image processing for presentations, videos, audio-visual material, etc. (such as Khroma Key, Dall-e 2, Hotpot, Deep Dream Generator, Stability AI, Deep AI), among others.

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We can affirm that artificial intelligence can be a very useful complement to promote active learning among students. Through these AI techniques and tools, personalized learning environments can be created that actively involve teachers and students, as well as allowing adaptation to different student profiles, providing continuous feedback to help develop skills and knowledge in a more motivating and effective way.

PRINCIPLE 2, guideline 3 "Encourage the exercise of executive functions": Executive functions are higher cognitive abilities that allow people to plan, organize, regulate, and evaluate their own behavior in order to carry out actions directed to an end. Executive functions such as planning (visual, procedural and temporal), sustained attention (visual and auditory), divergent thinking and creativity, working memory (visual and auditory-verbal), social reasoning, verbal fluency, motivation or self-regulation and impulse control, are skills that can be trained at the educational level and that constitute the scaffolding of intellectual development. No matter how much knowledge a student has, if he or she is not able to establish relationships between them, organize information, structure it, generate alternative answers, verbalize them, and control all these processes, it will be difficult for him or her to perform tasks successfully. But what role can artificial intelligence play in the development of such complex skills? The application of AI to the development of executive functions does not consist of the machine planning for the individual or being able to make decisions for him. The approach presented here refers to the use of these AI tools to train the skills in students. Thus, AI-based planning applications can help subjects learn to prioritize tasks or allocate appropriate time to them. They can also make recommendations based on reliable information to help them make decisions or even use virtual assistants to encourage self-regulation in tasks, providing reminders and tips to help them monitor themselves and control the process itself. AI can also be very useful to provide feedback on the progress of activities, thus favoring the learners' metacognitive processes.

Recepción: 16/05/2023 Aceptación: 13/07/2023

https://doi.org/10.52149/Sp21
ISSN 1886-5895

At this point, it is also appropriate to mention the relationship between neurolearning and artificial intelligence, as these are two fields that have become closely related in recent years. Neurolearning refers to how the brain works and how we learn, while artificial intelligence refers to the development of algorithms and artificial neural systems that mimic human intelligence. Artificial intelligence uses machine learning techniques and artificial neural networks, which are inspired by the structure and function of neural networks in the brain. This has led to significant advances in the understanding of the human brain and learning. On the other hand, knowledge of the human brain and how we learn can be used to improve artificial intelligence. For example, understanding how we process visual information in the brain has been used to develop more effective image recognition algorithms. In addition, artificial intelligence can be used as a tool to study the human brain. For example, artificial neural network models can be used to simulate specific cognitive processes and compare them with real brain processes. In general, the relationship between neurolearning and artificial intelligence is bidirectional. Neurolearning can help improve artificial intelligence, and in turn, AI can provide valuable insights into how the brain functions during learning. This interdisciplinary approach is promising and has the potential to lead to significant advancements in understanding the brain and developing more effective and efficient AI systems.

PRINCIPLE 3, guideline 1 "Use strategies and resources to capture interest": New technologies and, by extension, tools that incorporate artificial intelligence have all the necessary components to meet this guideline of capturing students' interest. In addition to being very attractive, AI programs encourage students to play an active role not only in the use of the tool, but also in the choice of content and type of task. Another way to capture interest has to do with the ability of the AI to graduate the levels of difficulty and plan the rewards, depending on the profile of the students using the program.

PRINCIPLE 3, guideline 2 "Provide options to maintain effort and perseverance": Once the interest in the task has been captured, it is essential that

Recepción: 16/05/2023 Aceptación: 13/07/2023

https://doi.org/10.52149/Sp21
ISSN 1886-5895

the teacher knows how to keep this interest active, to generate a dynamic of operation where the student strives to achieve the objectives proposed in that task. How can artificial intelligence favor these processes? AI programs have the advantage of being able to show real situations related to the content being worked on, thus reflecting the functionality of learning and enabling the transfer of what has been learned. Another way to maintain perseverance in students is to promote cooperative learning as opposed to competitive learning, vary the levels of demand, emphasize the importance of the process and not just the result, encourage collaboration with the community through the completion of useful tasks and provide positive feedback on achievements and their benefits, aspects that AI can achieve through the customization of tasks, the immediate feedback provided by its algorithms, the cooperation involved in the use of online learning platforms or the multiple existing gamifications.

PRINCIPLE 3, guideline 3 "Encourage self-regulation": To ensure that students can self-regulate at the instructional level, it is necessary to promote metacognition of the teaching and learning process itself, through three elements:

1.- Self-knowledge.

2.- Knowledge of the task.

3.- Knowledge of the strategy.

Self-knowledge is related to the information that the student has about his/her own abilities, expectations, interests, motivation, emotional situation, etc. Regarding knowledge of the task, it is essential that the learner knows what type of performance he/she must do (test, development, short questions, oral presentation, project, group work, poster, etc.). And finally, knowledge of the strategy refers to the type of procedure, technique or instrument that will be used to solve the exact task that is being asked, whether at a cognitive level (repetitive memorization, comprehensive, development of key ideas, mind map, etc.), type of approach (individual, collective), or use of different tools, where artificial

Recepción: 16/05/2023 Aceptación: 13/07/2023

https://doi.org/10.52149/Sp21
ISSN 1886-5895

intelligence programs, such as the controversial ChatGPT, would come in. Regarding this program, it is appropriate to say that AI tools are not good or bad by nature, but it depends on the use we make of them. It is also important to say at this point that artificial intelligence technologies are not intended to replace the work of teachers, but rather to redefine their role, to be guides and generators of learning situations. ChatGPT, as a trained language model, can be very useful for students, as it has a wide range of possibilities at didactic level, due to its ability to process and generate natural language. Some of the didactic applications include, among others:

- Answering questions from students, on topics they have previously worked on in class and mastered, to test the accuracy of the tool.
- Generating text from associations of concepts, to analyze the relationship established between them.
- Writing assistance, especially to help people with dysgraphia or dysorthography.
- Translation of texts into another language or simulation of dialogues for learning a foreign language.

4. ARTIFICIAL INTELLIGENCE AND ATTENTION TO STUDENTS WITH SPECIFIC EDUCATIONAL SUPPORT NEEDS

As stated in article 71.2 of the LOE, modified by the LOMLOE, students with specific educational support needs are understood as those who require educational attention different from the ordinary one due to "special educational needs, due to maturational delay, language and communication development disorders, attention or learning disorders, severe lack of knowledge of the language of learning, socio-educational vulnerability, high intellectual abilities, late entry into the educational system or personal conditions or school history". Artificial intelligence can be a useful tool to help educators intervene in the face of certain educational needs through the personalization processes it can perform, analyzing student profiles and providing recommendations for

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resources and activities adapted to each of them. AI can also help in the early detection of learning problems, analyzing student responses to identify patterns and trends that may indicate difficulties. AI can be very beneficial when intervening with students with literacy difficulties, providing tools for reading aloud (text-to-speech software), voice dictation and automatic grammar and spelling correction. For students with ASD (Autism Spectrum Disorder), AI can provide communication assistants and chatbots focused on emotion recognition and non-verbal communication translation. In the case of students with ADHD (Attention Deficit Hyperactivity Disorder), there are AI applications that monitor attentional processes and incorporate task reminders. For students with visual or hearing disabilities there are audio descriptors, sign language translation programs and subtitles, etc. It is important to note that the artificial intelligence tools we are referring to cannot replace the work of the professionals who attend to the students. Educators and specialists are a key element in the application of AI, not only in terms of its rational implementation, but also in the objectives we pursue when using it. AI also offers multiple possibilities for students with high abilities, such as access to more advanced learning materials, personalization of tasks, exploration of new areas of knowledge and opportunities to work in scientific subjects through online methods where they can exchange information with students from other countries, etc. As we can see, the possibilities are vast and the applications are almost infinite.

5. CHALLENGES OF EDUCATION WITH NEW TECHNOLOGIES AND THE TEACHER'S ROLE IN RELATION TO ARTIFICIAL INTELLIGENCE

New technologies are immersed in the educational landscape and are substantially transforming it. But this technological incorporation also presents a series of challenges that we must balance. On the one hand, despite the advances in the dissemination of ICT tools, there is still a significant digital divide that conditions the access of many students to the use of artificial intelligence. On

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the other hand, as in any innovation process, it is necessary to take time to accommodate and assimilate new changes or proposals for change. This inevitably requires an investment of time and resources that are not always commensurate with the needs of the proposed project. Likewise, artificial intelligence, no matter how much it simulates human intelligence, is not human intelligence and is subject to failures and cybernetic attacks that can expose personal data of special relevance to the lives of the subjects (medical diagnoses, personal and work information, etc.). In view of this, we can only say that absolute confidentiality is not fully guaranteed if this data is stored in a filing cabinet instead of in a cloud. Another challenge facing teachers in the use of new technologies in general and artificial intelligence in particular, is the information overload to which students may be exposed. In this sense, far from being a problem, this fact should be taken as an opportunity to train students' critical capacity and to know how to differentiate between relevant and irrelevant information. As a result of the global pandemic experienced by COVID-19, the importance of interactions with others and the terrible consequences that can result from social isolation have been highlighted. On many occasions, technology is blamed for causing isolation and a lack of social interaction. However, paradoxically, during the time when the global population had to be confined, the only window that made it possible to stay in touch with our loved ones was through technological tools. This doesn't mean that improper use of these resources cannot lead to social isolation. That's why it is crucial for educators to enable forms of online interaction to facilitate proper collaboration among students. As mentioned before, it is the way we use these tools that defines whether they are appropriate or not. This is where the role of teachers becomes particularly relevant as they generate learning situations. However, to do so, teachers need to be prepared to face the challenges of the knowledge society. Teacher training becomes indispensable and mandatory, as it enables educators to understand new procedures and stay updated to effectively respond to the latest technological developments. It is essential to consider the

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https://doi.org/10.52149/Sp21
ISSN 1886-5895

pedagogical framework within which new technologies and artificial intelligence should be integrated. Bearing this in mind, AI can provide teachers with the opportunity to create personalized educational content for students, considering their strengths and weaknesses. AI developers can also assist in creating new teaching tools, allowing teachers to design interactive gamified activities for their subjects (numerous apps are available for this purpose, such as Brainscape, Poll Everywhere, Plickers, Socrative, Elever, Super Teachers Tools, etc.). Furthermore, in terms of assessment and feedback, AI can offer strategies for providing more precise and immediate feedback to students. Ultimately, teachers can utilize AI to improve classroom management and optimize student learning, but it is crucial to first change perceptions of school culture and teaching processes and methods.

6. ETHICAL LIMITS OF ARTIFICIAL INTELLIGENCE

There is no doubt that discussing artificial intelligence carries a series of ethical implications that need to be addressed to anticipate potential problems in its implementation in education. Firstly, as we have discussed at the beginning of this article, artificial intelligence operates through algorithms. These algorithms are designed by humans and therefore, they are subject to the biases and prejudices of their creators. It is essential, therefore, to have regulations in place that ensure respect for human rights and fundamental freedoms, to prevent these algorithms from perpetuating or amplifying inequalities. On the other hand, AI systems are often designed to make decisions that can have varying degrees of impact on a person's life (for example, in academic, professional, or other guidance processes), where not only objective and quantifiable data are sources of decision-making. In this regard, it is important to always have professional supervision to provide the "human" aspect in such important procedures. The same applies if we intend to apply AI to decisions involving value judgments about behavior and enter the realm of ethics or justice. It is evident that reaching that level of thinking is still far beyond AI processors. Regarding the privacy and security of data, we must be aware that for AI to function properly, it needs to

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process large amounts of data to generate the necessary algorithms to provide an "intelligent" response. The way to obtain this data and the authorization for its use is a matter of vital importance today, as the economic future of companies and the marketing they employ will be based on the information (data) they have on potential users. And we are not just referring to the commercial sphere, but also to processes involving the participation of the population in social life (elections, voting, personnel selection, etc.). In this regard, the impact of AI on the job market can be enormous, not only due to the automation of many jobs but also through the selection of personal profiles for specific positions. It is therefore important to take the necessary time to reflect on these and other issues to establish appropriate limits for the incorporation of artificial intelligence into our lives.

7. THE COMING FUTURE

With a brief look into the future, we can confidently say that artificial intelligence is one of the most important and promising technologies of tomorrow. In the coming years, AI applications will likely have a significant impact in all areas of life, including healthcare, industrial and production processes, transportation, and, of course, education. The automation of certain tasks that previously required human intervention will bring greater efficiency and reduced production costs. La personalización de todo tipo de procesos facilitará la atención a toda clase de clientes ya sea a través de experiencias presenciales o en línea. AI applied to medicine will make it possible to manage large amounts of data that will help in the diagnosis and treatment of multiple diseases. Advances in safety, both in transportation and in the home and in industries, will enable greater efficiency and reduced risks for consumers and companies. As for the future of education, artificial intelligence has the potential to positively transform instructional spaces and processes, provided it is implemented appropriately. The role of the teacher is not diluted with AI, but becomes more relevant than ever, becoming the organizer and generator of learning situations, planning when, how and for what

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purpose these artificial intelligence programs are used. The personalization of education offered by AI may lead, in the not-so-distant future, to educational assistants (EducaBots) for each student, programmed with the appropriate parameters. These assistants will be able to individualize tasks and provide tailored learning experiences based on the specific profile of each person, considering their preferences, aptitudes, motivations, teaching style, potential learning difficulties, and more. They will offer real-time intelligent tutoring, adaptive learning tasks, data analysis, learning strategies, virtual mind organizers, or training in top-down skills. At this point, it is pertinent to discuss not only the technological tools that can be used in the future but also the curricular consequences of these tools. Access to information and data has been generalized to the entire population; the teacher is no longer the "guardian of wisdom", transmitted to expectant pupils. The democratization of information makes it possible to have at the touch of a button or a voice command, millions of pieces of information that previously had to be extracted from dusty books and memorized to make them available. At the present time and with much more sense in this future we are drawing, the learning of content should not be the goal of education since this information is at the fingertips of anyone. The challenge is, from my point of view, to "teach processes". And for this, the teacher's intervention is essential, because he/she is the one who brings soul to the educational process. Furthermore, there is another implication that, although our regulations do contemplate it, is not sufficiently rooted in the school curriculum, I am referring to the emotional aspects involved in human development and learning. Without emotion there is no learning, and for emotion to exist, there must be a human being behind it who transfers it to the learner. Artificial intelligence can free teachers from mechanical tasks and the constant preoccupation with transmitting "data" and leave them time to develop critical, creative, emotional, and intellectual thinking skills in students, which are the scaffolding of knowledge and cognitive development.

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But within this future in which we are venturing into, not only will the role of the teacher, the role of the student or the content and objective of learning change, but it will also affect the role of educational inspection in the development of these processes. Supervision tasks will not focus so much on administrative aspects, and actions aimed at assessing the pedagogical and didactic application of procedures, techniques and instruments will become more important. In this sense, artificial intelligence can help to automate and improve the processing of educational data that occupy much of the time of the inspector tasks, moving the office work to the educational center, making this professional a key piece for the development of supervision, control, advice, and guidance functions to the entire educational community. Finally, the Committee of Ministers of the Council of Europe adopted a recommendation in 2019 on education for digital citizenship, in which a key focus was the application of artificial intelligence in the educational context. This committee stated that: "artificial intelligence, like any other tool, offers many opportunities, but also poses many threats, so it is necessary to consider human rights principles in the initial design of its application. Educators must be aware of the strengths and weaknesses of artificial intelligence in learning so that technology empowers them, rather than dominates them in their practices of digital citizenship education. Artificial intelligence, through deep learning and machine learning, can enhance education. Similarly, developments in the field of AI can profoundly impact interactions between educators and students, as well as among citizens in general. Education professionals and school staff should be aware of the presence of artificial intelligence and the ethical challenges it poses within the context of schools" (Council of Europe, 2019).

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