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The Challenges of Learning Assessment in the Age of Artificial Intelligence

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Abstract. The continuous growth of artificial intelligence in the world and the consequent integration of this type of technology into the various economic sectors of societies seems to be triggering new relationships with machines, but also new ways of working. Education, as one of the most important sectors of a nation, can no longer escape this new reality of integrating this type of technology into teaching and learning processes. It is precisely because of this fact that this research emerges, which aims not to set aside or exclude this (r)evolution, but rather to consider them as important and useful tools for innovation in education, putting them at the service of this sector. In this sense, we believe that it is essential to carry out a study to identify and understand the main challenges in carrying out the process of assessing students in the age of artificial intelligence. A systematic review of the literature will be carried out, focusing only on the three years - the artificial intelligence boom - and through it we will try to identify the major challenges that educational agents, but especially teachers, face in assessing students, contributing to literacy in the area, but also to a serious debate on this issue that is already being discussed so much in educational institutions. The results suggest that there is a set of challenges that teachers have to deal with, which, according to the content analysis carried out, are related to authenticity, ethics and fraud.

Keyword: Artificial intelligence · Digital technologies · Education · Learning assessment

1 Introduction

Over the last year, much has been discussed about the impact of artificial intelligence on education, its advantages, disadvantages, challenges, opportunities and impacts associated with integrating this new era of technology - web 4.0 - into education and other teaching and learning processes. The countless studies that have emerged in this area have made a significant and indispensable contribution to a broader understanding of how AI can and should be integrated into education. Reflection and debate are very present in both the educational and scientific communities and are undoubtedly absolutely useful, relevant and central to the current reality of schools. We can no longer have digitally native students in a school that still teaches as it did in the last century.

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Teaching has to be reinvented, all of it, without exception. From updating the subjects to be taught, the process of teaching and transmitting knowledge, to lesson models and also with regard to the process of assessing students, whether in a face-to-face classroom context or in a virtual classroom context. Change is essential and urgent, otherwise the school will lose its main function: to educate!

It is in this sense that a serious reflection on the student assessment process is essential, especially at a time when artificial intelligence is present in the lives of citizens and in the lives of organizations, becoming a central aspect of the life of educational institutions, regardless of the cycle of studies.

Thus, this research seeks to identify the challenges of the student assessment process in the age of artificial intelligence, so that educational agents, namely heads of educational institutions and teachers, reflect in their educational communities on the best ways to assess today, given the exponential growth of web 4.0 technologies.

2 Methodology

Through this research we seek to make a systematic review of the literature identifying the main challenges of learning assessment in the age of artificial intelligence. For this, the systematic literature review is adopted as the investigative methodology to support the study. The systematic review of the literature will be carried out with the support of a pre-defined set of criteria that will be essential for the serration of information on the theme addressed, namely: (i) Time interval: 2019–2023; (ii) Documents: reference articles; (iii) Search language: English; (iv) Bibliometric databases: Scopus; (v) Other databases: Google Scholar; (vi) Keywords: challenges of learning assessment in the age of artificial intelligence; challenges that artificial intelligence brings to student assessment; artificial intelligence and the assessment of student learning; artificial intelligence and student assessment. It should be noted that although AI emerged several decades ago, we considered the 2019–2023 timeframe due to the fact that it was the AI boom and therefore there was more and more current literature.

The following set of exclusion criteria were also considered: (i) Articles published outside the established time frame; (ii) Documents that are not reference articles; (iii) Articles in languages other than English; (iv) Duplicate articles in different databases.

Based on the criteria previously established, the general framework of the documents found is presented (Table 1):

Table 1. General table of documents found

ID	Article name	Year	Authors
1	Implementation of Artificial, Intelligence in Imparting Education and Evaluatings Student	2019	Kumar, D. N.[1]
2	Vision, challenges, roles and research issues of Artificial Intelligence in Education	2020	Hwang, G. J., Xie, H., Wah, B. W., & Gašević, D. [2]

(*continued*)

Table 1. (*continued*)

ID	Article name	Year	Authors
3	Artificial Intelligence for Student Assessment: A Systematic Review	2021	González-Calatayud, V., Prendes-Espinosa, P., & Roig-Vila, R.[3]
4	A Review of Artificial Intelligence (AI) in Education from 2010 to 2020	2021	Zhai, X., Chu, X., Chai, C. S., Jong, M. S. Y., Istenic, A., Spector, M., … & Li, Y. [4]
5	A Review on Artificial Intelligence in Education	2021	Huang, J., Saleh, S., & Liu, Y. [5]
6	Artificial Intelligence for Assessment and Feedback to Enhance Student Success in Higher Education	2022	Hooda, M., Rana, C., Dahiya, O., Rizwan, A., & Hossain, M. S. [6]
7	The Promises and Challenges of Artificial Intelligence for Teachers: a Systematic Review of Research	2022	Celik, I., Dindar, M., Muukkonen, H., & Järvelä, S. [7]
8	Assessment in the age of artificial intelligence	2022	Zachari Swiecki, Hassan Khosravi, Guanliang Chen, Roberto Martinez-Maldonado, Jason M. Lodge, Sandra Milligan, Neil Selwyn, Dragan Ga˘sevi´c [8]
9	Artificial Intelligence Applications in K-12 Education: A Systematic Literature Review	2022	Zafari, M., Bazargani, J. S., Sadeghi-Niaraki, A., & Choi, S. M. [9]
10	Trends of Artificial Intelligence for Online Exams in Education	2022	Babitha, M. M., Sushma, C., & Gudivada, V. K. [10]
11	Systematic literature review on opportunities, challenges, and future research recommendations of artificial intelligence in education	2022	Xia, Q., Chiu, T. K., Zhou, X., Chai, C. S., & Cheng, M. [11]
12	Ethical principles for artificial intelligence in education	2023	Nguyen, A., Ngo, H. N., Hong, Y., Dang, B., & Nguyen, B. P. T. [12]
13	Establishing a delicate balance in the relationship between artificial intelligence and authentic assessment in student learning	2023	Lawrie, G. [13]
14	Exploring the Use of ChatGPT as a Tool for Learning and Assessment in Undergraduate Computer Science Curriculum: Opportunities and Challenges	2023	Qureshi, B. [14]

(*continued*)

Table 1. (*continued*)

ID	Article name	Year	Authors
15	Machine Learning and Deep Learning in Assessment	2023	Jiao, H., He, Q., & Yao, L. [15]
16	Artificial intelligence in education	2023	Holmes, W., Bialik, M., & Fadel, C. [16]
17	Can we and should we use artificial intelligence for formative assessment in science?	2023	Li, T., Reigh, E., He, P., & Adah Miller, E. [17]
18	A critical evaluation, challenges, and future perspectives of using artificial intelligence and emerging technologies in smart classrooms	2023	Dimitriadou, E., & Lanitis, A. [18]
19	Education in the Era of Generative Artificial Intelligence (AI): Understanding the Potential Benefits of ChatGPT in Promoting Teaching and Learning	2023	Baidoo-Anu, D., & Ansah, L. O. [19]
20	The Use of Artificial Intelligence (AI) in Online Learning and Distance Education Processes: A Systematic Review of Empirical Studies	2023	Dogan, M. E., Goru Dogan, T., & Bozkurt, A. [20]
21	Empowering learners for the age of artificial intelligence	2023	Gašević, D., Siemens, G., & Sadiq, S. [21]

Four documents were excluded because they were outside the lines of the research and, in this sense, twenty-one documents were considered for the purposes of this research.

The data collected from the documents that emerged from the search were categorized and treated in Microsoft Excel. The content analysis of the selected documents showed that there are a number of challenges in evaluation, which will be presented and discussed in the following section.

3 Challenges of Learning Assessment

Several documents were found that address some of the challenges of learning assessment in the age of artificial intelligence, so below we discuss the main results obtained.

– The use of AI to improve and automate assessment results in more effective classification [22–26]. However, most automatic classification is homogeneous and applied to only a few disciplines and domains, which indicates that the application of AI is at an early stage of development. In this sense, migrating the technology to authentic educational environments would present enormous challenges [26, 27];

- AI seems to help predict student performance, particularly in e-learning [28–30], such as the quality of participation, the completion of activities, among other aspects. Massive Open Online Courses (MOOCs) are clearly an example of the integration of this type of technology. However, selecting data for prediction is a challenge [11]. [29] argued that student data used in classical statistics may not be suitable for AI predictive models. In other words, selecting suitable data for predictive models of student performance remains a challenge, as the data is not the same as that used in traditional educational research [11];
- Assessing the impacts of AI-supported learning design on students' performances and perceptions can be another challenge. Other aspects can be taken into account, such as students' learning performance, learning motivation, learning anxiety, self-efficacy, cognitive load, the impacts of AI-supported learning designs on the performance and experience of students with different personal characteristics [2];
- The AI assessment model can also present other challenges, such as the "marginalization of professional knowledge", the "black box" of responsibility by placing decisions in the hands of programmers, the restriction of the role that pedagogy plays in assessment, the limitation of responsibility and the scope of learning and the pedagogy of surveillance [21];
- Research shows that a machine cannot take on the role of a teacher, and the way AI works and carries out processes in the context of teaching is far removed from human intelligence [31] and partly due to the lack of transparency in decision-making algorithms [32]. In this sense, AI training for teachers and students is important. It is essential to train teachers to use this technology [33], but not just on the basis of learning the tools, but also on the basis of pedagogical reference models that give meaning to the development of lessons. Several authors [34–36] have determined that AI requires specific training for students as future professionals, as they need to understand the characteristics, possibilities and limitations of these intelligent systems;
- Also other investigative work [16] raises some questions about the collection of accurate and comprehensive information about the student, the possibility of cheating and subversion of the system, and the dependence on efficient algorithms and large amounts of personal data, which raises ethical and of privacy;
- Another challenge is to ensure equity in the application of AI in education [5]. With the development of AI, developing countries run the risk of exacerbating divisions in education through new technologies. Since most AI algorithms come from developed countries, they cannot fully take into account the conditions in developing countries and cannot be applied directly [37];
- Ethical and security issues are another major challenge arising from the collection, use and dissemination of data. AI has raised many ethical questions in terms of providing personalized advice to students, collecting personal data, data privacy, and ownership of responsibilities and data-feeding algorithms [12, 38, 39]. Strengthening oversight of AI technology and its products requires the public to discuss the ethics, responsibility and safety involved [5];

- The creators of AI teaching products must also understand the way teachers work and create a plan for using teaching products that is convenient for teachers [5]. Only in this way will it be possible to ensure that teachers acquire skills in AI technologies for student assessment;
- Another challenge is the limited technical capacity of AI [7] as, for example, the AI may not be efficient for scoring graphics or figures and text. [40] reported that an AI-based system failed to assess the complexity of texts when they included images. That is, automated writing evaluation technologies that use AI algorithms have to be improved to provide trustworthy evaluations for teachers [41]. AI-based scoring may sometimes improperly evaluate performance [42];
- The literature shows that AI-generated text detectors are not effective with current sophisticated natural processing language models [43, 44]. This means that, for the purposes of evaluating work carried out by students, teachers must be aware of this situation in order to guarantee a more serious and rigorous evaluation;
- In another research [17], three more challenges related to evaluation were identified. Thus, AI can: (i) Be biased and not take into account the cultural and linguistic diversity of students; (ii) Not being able to recognize and value students' most unexpected and rich ideas; (iii) Represent risks to the art and practice of teaching, with potential negative consequences for student learning;
- The lack of digital competences of teachers [45] and the lack of technical infrastructure in schools [46] are two more challenges in integrating AI into education;
- Finally, other important challenges in applying AI in assessment are related to the interpretability and validity of results obtained through machine learning and deep learning [15].

The assessment process in a face-to-face or virtual teaching-learning context is, without a doubt, a subject that has received a lot of attention from the educational community. The literature shows that teachers have limited capacity and skills to engage in high-quality assessment practices that boost learning [19]. Perhaps for this reason, educators have consistently called on teachers to develop skills to engage students in high-quality assessment practices [47–49]. Training and empowering teachers in this area is essential to develop the skills needed to harness the power of AI to engage in high-quality assessment practices that improve student learning [19].

4 Conclusions

The research made it possible to contribute to the discussion of artificial intelligence in education, especially with regard to the main challenges in the assessment process in the new AI age.

According to the research, there are several challenges facing the school as an institution and teachers as players in this evaluation process. These challenges emerge from the evolution of the times, the transformation of the school as a constantly changing context and also from the change and innovation of teaching practices in the teaching-learning processes.

The challenges set out in the results are related to the lack of skills and knowledge in artificial intelligence, conditioning their literacy in the area, a situation that could

jeopardize the integration of AI into students' assessment processes. Another challenge seems to be the loss of teachers' roles in assessment processes, which could consequently lead to the teacher's role becoming less visible, whether in a face-to-face classroom context or online. The adequacy of teachers' assessment methods is another challenge, since these methods must be adjusted to the integration of AI in education. Understanding the results of AI is another challenge that must be taken into account, since it is up to the teacher and not AI to make decisions about the results. Another challenge identified in the results is the prevention and detection of plagiarism, which can be practiced through AI tools that continue to emerge on the market. It is also crucial for teachers to have digital AI skills in order to understand whether the results generated by AI are actually equitable. Not only are digital skills important, but also pedagogical skills, essentially best practices in the use of AI in both the teaching process and student assessment.

The big challenge is not to limit the use of AI in education, to set it aside or avoid it, but to gradually integrate it into the teaching-learning process, in teaching, in the proposal of activities and in student assessment, among other dimensions. The challenge is therefore to integrate AI into education! However, it is necessary to train teachers in the proper and contextualized use of AI technologies in the teaching-learning process, but also the students who are key players in this process. In addition to AI training aimed at acquiring skills, it is also important to collaborate and share with colleagues, to promote students' digital literacy and to promote sessions on privacy, safety and ethics.

AI has made a contribution to education in all its dimensions, however, it is necessary to train educational agents in its correct use, making them especially aware of ethical issues. We are in a new world in which all educational agents have to adapt and processes have to be adapted to this new reality. It's undoubtedly a great opportunity to innovate in education with everyone!

5 Limitations and Future Research

There are two limitations to the study that it is important to mention, firstly the fact that the subject of artificial intelligence is very recent, which on the one hand makes it difficult to find sources on the subject of the research, and on the other hand it is not yet possible to have access to consolidated literature in the area. Another limitation is that the systematic literature review was not comprehensive or representative of all the evaluation criteria for education research, as it was limited to the keywords defined in the methodology section.

Despite these limitations, our study provides valuable insights into the challenges of assessment in learning contexts where artificial intelligence is increasingly present.

As future work, we believe it is important to identify and characterize a set of intelligence tools that will enable teachers to guarantee greater efficiency and accuracy in the student assessment process.

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