Editorial of the IJET special issue on "Artificial Intelligence and the paradigm shift of teachers' role"

Editoriale del numero speciale di IJET su "Intelligenza Artificiale e cambiamento di paradigma del ruolo degli insegnanti"

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Technological 'evolution' has always influenced the world of education by providing new opportunities and challenges for teachers, school leaders, students, and families. Among the various technologies today, artificial intelligence (AI) is the one that attracts most of the interest. In fact, for the last two decades, the intertwining of AI and education has been the subject of intense study, so much so that research in this field has already contributed to providing the first evidence, in particular by demonstrating the ability of AI-based systems to meet the individual needs of students (Brusilovsky, 1996; Azevedo, 2002; Nye, 2015; Hemmler & Ifenthaler, 2022; Azevedo et al., 2022).

However, the 'new renaissance' that AI is experiencing, generated by innovations coming mainly from research in deep learning and generative AI, seems to outline scenarios that go far beyond the effect that new technologies typically have in the educational sector (Gentile et al., 2023a). In fact, recent advances in AI seem to have the power to reshape traditional educational paradigms (Ifenthaler et al., 2024), so much so that there is a discussion on how AI may influence the academic sector and future educational policies.

In this context, which forms a paradigm shift (Kuhn, 1970), teachers are certainly one of the key players involved and called upon to be actively involved in the change processes. After all, teachers have always been called upon to update their teaching practices by seeking to integrate new technologies rather than reject them. However, even in relation to the teacher's role, the changes introduced by AI signal a radical change.

The special issue, "*Artificial Intelligence and the paradigm shift of teachers' role*", aims to assess this dimension that recent AI advancements in education have produced. Through a meticulous peer-review process, we selected five papers that contribute different points of view concerning the dimensions of change in the teacher's role (Gentile et al., 2023b).

With respect to the dimension of teachers' professional development, using the concept of transitional space, Iannella proposes an interpretation of generative artificial intelligence (GenAI) as an opportunity for growth for individuals and, in particular, for teachers' professional development. The author posits that the interaction with these systems materialises the transitional space as a playground where diverse realities coexist. This view calls upon teachers to be metacognitive practitioners, possessing complex knowledge that involves a dynamic relationship between technology, pedagogy, and the subject matter they teach.

However, the professional development strategies of teachers that policymakers will introduce have to consider the existing gap between urban and rural schools, seeking to ensure that the opportunity for change offered by the advent of AI does not contribute to widening this gap but rather is an opportunity for inclusion.

This is the theme of the contribution of Mangione and colleagues, who, in their study, present the results of a scoping review.

Raising teachers' awareness regarding the possible advantages and disadvantages of AI technologies requires an understanding of the underlying mechanisms. Therefore, a thorough examination of the definition of AI literacy is necessary.

Biagini and colleagues tackle this issue by showcasing the findings of a study that evaluates the AI literacy of doctoral students in a socio-educational setting, thereby representing the future generation of researchers and lecturers.

The study underscores the need for a more comprehensive approach to AI literacy, which includes a deeper understanding of its ethical, social, and economic implications, by analysing the cognitive, operational, critical, and ethical dimensions of AI in education.

Bosch and Kruger instead focus on how AI changes teacher-student interaction from a self-directed learning perspective. In their contribution, the authors explore the integration of chatbots as an open, dynamic, and customisable teaching resource in teaching and learning processes related to self-directed learning approaches. In this context, the authors suggest guidelines for integrating these technologies, considering the potential roles of both students and teachers.

Finally, Mastrogiacomi's contribution explores how the role of educators is transforming into that of facilitators of change who promote a use of technology capable of supporting and sharpening students' metacognitive skills. The author highlights how educators must work in collaboration with AI, redefining the boundaries of professional and personal training.

1. References

Azevedo, R. (2002). Beyond intelligent tutoring systems: Using computers as METAcognitive tools to enhance learning? *Instructional Science*, *30*(1), 31–45. https://doi.org/10.1023/a:1013592216234

Azevedo, R., Bouchet, F., Duffy, M., Harley, J., Taub, M., Trevors, G., Cloude, E., Dever, D., Wiedbusch, M., Wortha, F., & Cerezo, R. (2022). Lessons learned and future directions of MetaTutor: Leveraging multichannel data to scaffold self-regulated learning with an intelligent tutoring system. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.813632

Brusilovsky, P. (1996). Methods and techniques of adaptive hypermedia. *User Modeling and User-Adapted Interaction*, *6*(2–3), 87–129. https://doi.org/10.1007/bf00143964

Gentile, M., Città, G., Marfisi-Schottman, I., Dignum, F., & Allegra, M. (2023a). Editorial: Artificial intelligence for education. *Frontiers in Education*, *8*. https://doi.org/10.3389/feduc.2023.1276546

Gentile, M., Città, G., Perna, S., & Allegra, M. (2023b). Do we still need teachers? Navigating the paradigm shift of the teacher's role in the AI era. *Frontiers in Education*, *8*. https://doi.org/10.3389/feduc.2023.1161777

Ifenthaler, D., Majumdar, R., Gorissen, P., Judge, M., Mishra, S., Raffaghelli, J., & Shimada, A. (2024). Artificial intelligence in education: implications for policymakers, researchers, and practitioners. Technology, Knowledge and Learning. https://doi.org/10.1007/s10758-024-09747-0

Hemmler, Y., & Ifenthaler, D. (2022). Four perspectives on personalized and adaptive learning environments for workplace learning. In D. Ifenthaler & S. Seufert (Eds.), *Artificial intelligence education in the context of work* (pp. 27–39). Springer. https://doi.org/10.1007/978-3-031-14489-9_2

Kuhn, Thomas (1970). *The structure of scientific revolutions* (2nd, enlarged ed.). University of Chicago Press.

Nye, B. D. (2014). Intelligent Tutoring Systems By and for the Developing World: A review of trends and approaches for educational technology in a global context. *International Journal of Artificial Intelligence in Education*, *25*(2), 177–203. https://doi.org/10.1007/s40593-014-0028-6