

Teachers and Artificial Intelligence: Developing Digital Citizenship Skills*

Ylenia Falzone, *University of Palermo*, ylenia.falzone@unipa.it
Benedetta Miro, *University of Palermo*, benedetta.miro@unipa.it
Elif Gülbay, *University of Palermo*, elif.gulbay@unipa.it

Abstract

Artificial Intelligence (AI) represents the peak of transformative technological innovations in education. In this context, the development of pedagogical and digital citizenship skills in teachers is crucial. This work stems from the state of the art on teaching of AI and in-depth analysis of free tools for the use of this technology. Subsequently, we present a study conducted on a sample of 200 sicilian future teachers collecting their opinions on the use of AI in teaching.

These activities aim at bringing future teachers closer to the world of AI by guiding them in the creation of AI-based systems. This study allowed future teachers to analyze the potential of AI, start a self-assessment process and understand how to develop all the required skills for using AI.

Keywords: digital citizenship; artificial intelligence; teacher training; ethic issues; ChatGPT.

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1. Understanding the implication of AI in education

Artificial Intelligence (AI) is transforming different fields, including education and teaching approaches. In this context, AI plays an increasingly significant role in education, offering students and teachers access to advanced and personalised educational resources. In order to participate productively in the AI era, it is essential that future teachers acquire a fundamental understanding of how AI works and how it will impact their lives (Gentile et al., 2023; Baidoo-Anu & Owusu Ansah, 2023). This competence becomes even more relevant in light of recent advances in the field of *deep learning*, which have made possible the development of advanced technologies such as generative artificial intelligence. Such technologies, including Generative Adversarial Networks (GANs) and Generative Pre-trained Transformers (GPTs), use existing digital content, such as video, images, text and audio, to create new artificial artifacts based on the analysis of patterns and distributions learned during the training process (Baidoo-Anu & Owusu Ansah, 2023). Integrating this knowledge into teacher training not only fosters a critical understanding of AI, but also prepares teachers to harness these technologies to enhance learning and address future challenges in education.

Several studies show how AI represents a significant evolution in the field of educational design, outlining its potential for adapting learning environments to the unique needs of students, such as Intelligent Tutoring Systems or Learning Analytics (LA) (Ayeni et al., 2024; Bahroun et al., 2023; Pagliara & Bonavolonta, 2024)

AI offers numerous benefits in education, revolutionizing the teaching and learning experience. Here are some key indicators:

- automating administrative tasks: AI streamlines administrative tasks such as attendance tracking, grading, and scheduling, freeing up valuable time for teachers to focus on meaningful interactions with students;
- assistance in task creation and assessment: AI-powered tools help teachers create performance tasks, develop rubrics, and assess student work efficiently. This enables educators to provide targeted feedback tailored to individual learner needs;
- personalization of learning: AI facilitates personalized learning experiences by providing learners with choices and opportunities to express their voices. This fosters a sense of ownership over their education journey,
- enhanced understanding through interactivity: AI enables more interactive and immersive learning experiences through simulations, virtual reality, and adaptive learning platforms. This fosters deeper understanding and engagement among students;
- identification of struggling students: AI algorithms can analyze student performance data to identify patterns indicative of struggling learners. With this insight, teachers can intervene early and provide targeted support to help students succeed;
- fostering curiosity and exploration: AI-powered learning tools encourage curiosity by offering learners access to a wide range of topics and perspectives. This promotes exploration and critical thinking skills development.

The analysis and data management capabilities of the most modern AI systems pose themselves as important support tools for teaching activities (Fabiano, 2024). They make tasks that are repetitive and take a lot of time easier and better, which gives teachers more time to focus on important things. Some examples of these tools are systems for managing learning, platforms for making educational content, software that changes based on how students are learning, and programs for tutoring online. These tools not only help with tasks like organising classes and grading, but they also use fancy technology to assess students' progress. They can figure out patterns in how students learn and see where they might need help. Teachers can then use this information to make learning better for each student and find problems early. Remarkably, these tools are continuously updated with self-learning strategies as people use them, ensuring they remain effective for innovative teaching methods.

However, the introduction of AI in education also raises important ethical and privacy issues. It is evident that the use of AI has raised many ethical (Bodò et al., 2017; Southgate, 2020) and security issues in relation to the collection, use and dissemination of data. For this reason, it is important to

know what issues may arise when AI is introduced in the educational context and to help teachers better prepare for this new challenge. In this regard, UNESCO introduced global standards for AI ethics, which were adopted and signed by 193 member countries on 25 November 2021. The recommendation is addressed to policymakers and includes four 'values':

1. respect, protection and promotion of human rights and fundamental freedoms and human dignity;
2. living in peaceful, just and interconnected societies,
3. ensuring diversity and inclusiveness;
4. living in a thriving environment and ecosystem.

These values are to be implemented according to the following 'principles', which recall those of digital citizenship: Proportionality and Do No Harm, Safety and Security, Fairness and Non-Discrimination, Sustainability, Privacy, Human Oversight and Determination, Transparency, Accountability and Reliability, Awareness and Literacy, Governance and Adaptive and Multistakeholder Collaboration. This agreement emphasises the importance of ethics in the field of AI worldwide, highlighting the dangers associated with cultural, social and environmental diversity while creating a universal value framework (Nguyen et al. 2023). More recently, in 2023, UNESCO published *Guidance for Generative AI in Education and Research*, highlighting that generative AI technologies, such as ChatGPT, have introduced additional ethical and operational issues.

2. Artificial Intelligence and Digital Citizenship

The link between digital citizenship and AI is complex and multidimensional. On the one hand, AI can facilitate a more active and informed digital citizenship, transforming individuals from mere consumers of information to active and aware participants; on the other, it is essential that citizens develop critical skills to navigate this new information landscape. The opportunities for efficiency, innovation, and growth related to the use of AI require reflection on its long-term effects, calling for an ongoing effort to balance progress and ethical responsibility (Gulbay et al. 2024).

A good digital citizen can discern between reliable information and disinformation, a task made difficult by the proliferation of manipulative content and the spread of fake news (Falzone, 2024). AI, while offering tools for fact-checking and identifying misleading content, is not a panacea. Indeed, the use of algorithms and recommendation systems can sometimes contribute to creating information bubbles, reinforcing distorted views of reality.

Moreover, the issue of transparency is crucial. It is important to understand how algorithms work to influence the information they receive and how these decisions may impact their civic involvement.

It can be argued that the link between digital citizenship and artificial intelligence is characterised by a balance between opportunities and risks. To fully exploit the potential of AI in promoting meaningful civic participation, it is crucial that citizens are equipped with the necessary skills to deal with the challenges of misinformation and manipulation. Indeed, these two 'realities' are extremely dependent and interconnected; aiming for an increasingly ethical use of technology and the digital world must be a priority, especially for the educational world (La Marca & Falzone, 2024).

Training teachers means providing them with opportunities to develop the skills they need to understand the actual benefits but also the potential risks and limitations of using AI. It is crucial that they are able to critically understand the impact of AI in the educational context, acquiring skills to consciously assess how to use these technologies in an ethical and responsible manner, for the benefit of their students and the entire educational process. Therefore, it is necessary to educate citizens in the development and consequent application of critical thinking, read as an essential filter to be applied with and to the approach to AI.

An arduous task, continuing in this direction, is that entrusted to those in charge of training and learning-teaching, who must be able to provide students with an adequate 'toolbox', a toolkit, that can enable them to orient themselves in an increasingly technological world. This process will inevitably lead to the development of a greater sense of responsibility and attention towards all that

the digital and/or artificial world makes available to them, leading, we hope, to an increasingly aware and mature use of the advanced tools that technology offers us today.

In order to train teachers in the critical use of artificial intelligence, it is important to integrate AI education into the school curriculum in a cross- and multidisciplinary manner. Simulations, case studies and realistic scenarios can be used to make students understand how AI is used in different contexts and fields. In addition, involving experts in the field, educational institutions and the local community can offer different perspectives on the use of AI and stimulate debate on ethical and social issues.

Integrating AI into the educational context helps improve the learning experience that teachers offer their students. By aligning AI technologies such as ChatGPT to the curriculum, teachers ensure that the integration is seamlessly integrated into the existing teaching framework, fostering a cohesive and effective learning environment. For inquiry-based learning, ChatGPT and AI can help encourage students to ask questions, explore topics and engage in self-directed learning. By posing prompts or open-ended challenges, teachers can guide students to use ChatGPT as a tool for exploring and analysing problems. This approach helps students develop critical thinking skills and digital citizenship skills, as it encourages them to reflect, research, and consider different perspectives and possible solutions. The personalised feedback and differentiation offered by AI tools allow teachers to meet the needs of individual students, offering the possibility to provide targeted instruction and support, ultimately leading to better student outcomes.

3. Structure of the training program

In an effort to enhance the educational landscape and equip educators with innovative tools, a comprehensive training program was conducted with 200 sicilian future teachers focusing on understanding and addressing concerns related to the use of AI in education (Table 1).

Modules	Activities
Understanding and addressing concerns related to the use of AI in education	<ul style="list-style-type: none"> • Introduction to the potential of AI in education. • Open discussion on the ethical and pedagogical concerns of students regarding the use of Generative AI. • Brainstorming activities to identify and resolve doubts and uncertainties.
Practical training on effective and ethical use	<ul style="list-style-type: none"> • Guided hands-on session on using ChatGPT for creating educational resources (e.g., exercises, interactive stories, and quizzes). • Discussion on interaction models and appropriate language to use with ChatGPT. • Guided hands-on session on using Copilot for creating educational resources.
Experiencing ChatGPT in teaching	<ul style="list-style-type: none"> • Presentation of case studies on using ChatGPT to enhance students' learning experience. • Hands-on activity to design lessons or educational activities using ChatGPT as a teaching aid. • Discussion on the results obtained and the potential for integrating ChatGPT into the primary education curriculum.

Table 1: Training program organization

The training starting with an insightful introduction to the potential of AI in education. Future teachers delved the possibilities that AI offers, from personalized learning experiences to enhanced student engagement. We started an open discussion where ethical and pedagogical concerns regarding the use of Generative AI were explored. Future teachers engaged in thought-provoking conversations, reflecting on the implications of AI integration in the classroom and its impact on student learning and development. Brainstorming activities were then conducted to foster collaboration and problem-solving among educators. Future teachers worked together to identify and resolve doubts and

uncertainties surrounding the implementation of AI in education, ensuring a thorough understanding of the technology implications.

Moving on to practical training, teachers participated in guided hands-on sessions focused on the effective and ethical use of AI tools. They were introduced to ChatGPT, a versatile AI platform, and learned to create educational resources such as exercises, interactive stories, and quizzes. Through interactive discussions, teachers explored different interaction models and appropriate language to use with ChatGPT, ensuring effective communication with the AI system. Additionally, teachers were guided through hands-on sessions on using Copilot, further expanding their toolkit for creating educational resources. This practical training equipped educators with the skills needed to leverage AI tools effectively in the classroom.

Experiencing ChatGPT in teaching was a highlight of the training program. Teachers were presented with case studies showcasing the successful integration of ChatGPT to enhance students' learning experiences. They actively engaged in hands-on activities, designing lessons and educational activities with ChatGPT as a teaching aid. Through reflective discussions, teachers analyzed the results obtained and explored the potential for integrating ChatGPT into the primary education curriculum.

4. Analysis of the training program

The training program provided future teachers with a comprehensive understanding of AI in education, equipped them with practical skills for its implementation, and fostered a collaborative environment for exploring its potential. As AI continues to shape the future of education, teachers are empowered to embrace these technologies and create enriching learning experiences for their students.

In order to analyse the training course conducted, the teachers were asked to write critical reflections on the training course they undertook. A thematic analysis of the responses was conducted by creating qualitative categories reflecting the most common and recurring observations (Table 2).

Categories	Description
Use in education	Discussion and analysis of the ways in which AI can be used in the context of education.
User friendliness and accessibility	Considerations on the user-friendliness of AI, including accessibility aspects for users with different levels of technological competence. User interface, intuitiveness and tools to make interaction with AI more accessible are discussed.
AI differences and capabilities	It includes discussions on differences in functionality, text generation capabilities and practical applications in different contexts.
Impact on teaching and learning	The use of AI in education to improve teaching effectiveness, stimulate creativity and facilitate cultural integration. Gaps in understanding and personalisation of learning.
Usefulness and limits of AI	The usefulness of AI for grammar correction and support, while highlighting the need for conscious use and critical supervision to achieve effective results.
Future training and preparation	Includes considerations on task automation, required skills and career prospects influenced by the advancement of AI
Ethical implications and privacy	Ethical concerns and privacy considerations associated with the use of AI. Includes discussions on transparency in the use of data, privacy protection and the social impact of technologies.
Positive feedback	It includes praise for the effectiveness of the responses, the quality of the results generated and the overall experience.
Educational challenges	It includes problems of adaptation, teacher training and acceptance by students and parents.

Table 2: Categories emerging from thematic analysis

The thematic analysis conducted revealed several key aspects related to the use of AI in educational contexts. Teachers have honed their skills in formulating prompts for generative AI systems. It is important to formulate clear and detailed prompts to avoid ambiguity in the answers generated by the model. This emphasises how crucial accuracy in question construction is to obtain relevant and precise information. Addressing the ethical implications of these instruments revealed confusion and disorientation around these issues. Teachers testified that they had a greater understanding of the risks related to their privacy, this also provided a general awareness of the limitations of AI. For instance, ChatGPT is not immune to errors or misunderstandings, especially when dealing with complex texts, and users must be prepared to interpret answers critically. In connection with this, it was emphasised that the information provided by ChatGPT should always be verified through reliable external sources. This approach promotes a habit of critical evaluation and helps students to distinguish between reliable and unreliable sources. Another theme that emerged was the need to use AI under the supervision of teachers, who can guide and direct the use of the tool consistently with educational objectives.

The importance of continuous feedback and monitoring by teachers was also recognised, particularly by observing how students interact with these systems and providing them with guidance to guide the use of this tool. This highlights the importance of adequate training to allow students to understand both the potential and limitations of ChatGPT, while learning the correct ways to interact with the system. Finally, the need to periodically update and revise the guidelines for the use of ChatGPT was emphasised. Such revision allows the guidelines to be adapted to changes in technology and the educational environment, ensuring that its use remains appropriate and effective at all times.

5. Conclusions

The training program on integrating AI into education has been a transformative experience for teachers, equipping them with the knowledge and skills needed to navigate the complexities of AI integration in the classroom. Through engaging discussions, practical training sessions, and hands-on activities, teachers have gained a deeper understanding of the potential of AI to enhance student learning experiences.

By addressing concerns related to ethics, pedagogy, and effective use of AI tools, educators are now better prepared to harness the power of AI responsibly. The brainstorming activities facilitated collaborative problem-solving, enabling teachers to identify and resolve uncertainties surrounding AI implementation.

Practical training sessions on using ChatGPT and Copilot have empowered teachers to create engaging educational resources, fostering creativity and innovation in teaching practices. The presentation of case studies has provided valuable insights into real-world applications of AI in education, inspiring teachers to explore new possibilities for enhancing their teaching methodologies. As we reflect on the outcomes of this training program, it is evident that AI has the potential to revolutionize education, offering personalized learning experiences and empowering educators to meet the diverse needs of their students. By integrating AI into the curriculum, teachers can cultivate critical thinking, creativity, and digital literacy skills among students, preparing them for success in an increasingly AI-driven world.

Moving forward, it is essential to continue providing support and resources for educators as they navigate the ever-evolving landscape of AI in education. By fostering a culture of lifelong learning and adaptation, we can ensure that educators remain at the forefront of innovation, driving positive change in the education sector.

Bibliography

- Ayeni, O. O., Al Hamad, N. M., Chisom, O. N., Osawaru, B., & Adewusi, O. E. (2024). AI in education: A review of personalized learning and educational technology. *GSC Advanced Research and Reviews*, 18(2), 261-271.
- Bahroun, Z., Anane, C., Ahmed, V., & Zacca, A. (2023). Transforming education: A comprehensive review of generative artificial intelligence in educational settings through bibliometric and content analysis. *Sustainability*, 15(17), 12983.
- Baidoo-Anu, D., Owusu Ansah, L. (2023). Education in the Era of Generative Artificial Intelligence (AI): Understanding the Potential Benefits of ChatGPT in Promoting Teaching and Learning. *Journal of AI*, 7(1), 52-62.
- Bodo, B., Helberger, N., Irion, K., Zuiderveen Borgesius, F., Moller, J., van de Velde, B., ... & de Vreese, C. (2017). Tackling the algorithmic control crisis—the technical, legal, and ethical challenges of research into algorithmic agents. *Yale JL & Tech.*, 19, 133.
- Fabiano, A. (2024). La relazione tra l'esperienza, l'educazione e l'Intelligenza Artificiale. *I PROBLEMI DELLA PEDAGOGIA*, 1(Gennaio/Giugno 2024, Supplemento), 31-44.
- Falzone, Y. (2024). *Cittadinanza digitale e formazione iniziale degli insegnanti*. Lecce: PensaMultimedia.
- Gentile, M., Città, G., Perna, S., & Allegra, M. (2023, March). *Do we still need teachers? Navigating the paradigm shift of the teacher's role in the AI era*. In *Frontiers in Education* (Vol. 8, p. 1161777). Frontiers Media SA.
- Gulbay, E., Falzone, Y., & La Marca, A. (2024). *Intelligenza Artificiale e formazione dei futuri insegnanti*. Lecce: PensaMultimedia;
- Holmes, W., & Miao, F. (2023). *Guidance for generative AI in education and research*. UNESCO Publishing.
- La Marca, A., & Falzone, Y. (2024). Intelligenza artificiale e ricerca educativa: sperimentare l'uso di ChatGPT nei corsi universitari. In R. Viganò e C. Lisimberti (a cura di), *A cosa serve la ricerca educativa? Il dato e il suo valore sociale* (pp. 267-277). Lecce: Pensa MultiMedia.
- Nguyen, A., Ngo, H. N., Hong, Y., Dang, B., & Nguyen, B. P. T. (2023). Ethical principles for artificial intelligence in education. *Education and Information Technologies*, 28(4), 4221-4241.
- Pagliara, S. M., & Bonavolonta, G. (2024). Intelligenza artificiale ed elementi per la progettazione educativa. *MIZAR*, (20), 4-16.
- Southgate, E. (2020). *Artificial intelligence, ethics, equity and higher education: A 'beginning-of-the-discussion' paper*. National Centre for Student Equity in Higher Education, Curtin University, and the University of Newcastle
- UNESCO. (2021). *Recommendation on the Ethics of Artificial Intelligence*. United Nations Educational. <https://unesdoc.unesco.org/ark:/48223/pf0000379920.page=14>