



Teacher education is a deeply pedagogical process rooted in values, ethics, and the social purpose of schooling. Globally, it sits at the core of educational quality and fairness, as research in comparative and international education demonstrates: the training of teachers directly influences students' learning chances, social inclusion, and the democratic aims of schools. Teachers are not simply transmitters of curricula, but active professionals whose convictions, reflective skills, and ability to manage the complexities of classroom life give shape and substance to the educational experience itself.

The pedagogical dimension of teacher education frames teaching as a relational, context-aware, and ethically grounded profession rather than just a set of procedural skills. From a research perspective, this demands robust research methodologies that can critically examine the complex realities of schools and inform evidence-based policies. Equally important is the connection between theory and practice, which helps to bridge the persistent gap between universities and schools.

The contributions gathered in this volume reflect the richness and diversity of experiences showcased during the ATEE Spring Conference 2024, held at the University of Bergamo from May 29 to June 1, 2024. The volume presents 70 selected papers out of more than 300 presented by researchers representing over 40 countries.

This broad spectrum of studies highlights promising directions that can inspire renewed inquiry and concrete proposals aimed at improving contemporary educational systems.

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ATEE Spring Conference 2024

## ATEE Spring Conference 2024

### Teacher education research in Europe: trends, challenges, practices and perspectives

May 29<sup>th</sup> - June 1<sup>st</sup>, 2024  
S. Agostino, Bergamo



Edited by Nicole Bianquin and Francesco Magni





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# BOOK OF PROCEEDINGS

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**S. Agostino, 2 - Bergamo, Italy**

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# **The Use of Artificial Intelligence in Secondary Schools: Experiences in Initial Teacher Training**

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## **Abstract**

The integration of Artificial Intelligence (AI) in education has the potential to transform teaching and learning. AI's capacity for personalized learning aligns with the goals of inclusive education, as emphasized by UNESCO and the EU. However, effective integration requires pedagogical relevance and critical AI literacy. This study at the University of Turin explores AI's integration into teacher training (TT) through two programs in 2023/24, focusing on inclusive education. Both curricula included AI training: one program developed guidelines for a pedagogically meaningful use of AI, while the other introduced them to teachers in training. We propose a framework for integrating AI in TT, addressing its potential, challenges, and impact on schools, teachers, and students.

**Keywords:** artificial Intelligence; school inclusion; teacher training; learning technologies; special educational needs.

## 1. Artificial Intelligence in Inclusive Education: A Framework for Teacher Training in the Italian Context

In recent years, Artificial Intelligence in Education (AIED) has gained increasing attention due to its transformative potential at both academic and institutional levels. Since 2017, the academic literature on AIED has expanded significantly, particularly in the United States and China (Zawacki-Richter *et al.*, 2019), with the Covid-19 pandemic accelerating the adoption of educational technologies (EdTech).

International organizations have addressed this interest in three ways. First, UNESCO has recognized the role of AI in promoting inclusive and quality education, contributing to the achievement of Sustainable Development Goal 4 (UNESCO, 2019; 2021a; 2021b). Second, the European Parliament adopted the AI Act (European Parliament, 2023), emphasizing the need for AI regulation to prevent discrimination and ensure educational equity (Flores-Vivar & García-Peñalvo, 2023). Thirdly, there is a growing need to train teachers to use AI critically and pedagogically, as emphasized by Hrastinski *et al.* (2019).

To address these challenges, UNESCO has developed the "AI Competency Framework for Teachers" (AI CFT), which promotes an ethical, critical and progressive approach structured in three stages – Acquire, Deepen and Create – to effectively and consciously integrate AI into educational settings (UNESCO, 2024).

The UNESCO framework also emphasizes the importance of adapting the integration of AI to local specificities, as educational needs vary across communities and socio-cultural contexts. To ensure effective implementation, it is crucial to develop flexible competency frameworks and design training programs that take local specificities into account. This approach promotes the responsible use of AI and ensures that teachers are adequately supported in their continuous professional development and the critical integration of these technologies into educational practice.

AIED has the potential to revolutionize education by enabling the development of personalized learning pathways that are more inclusive and responsive to individual student needs. AI-based tools could be used by teachers to adapt educational offerings, supporting students with learning difficulties or from disadvantaged backgrounds. For example, virtual assistants and machine learning systems could facilitate activities such as reading, writing and mathematics and suggest personalized strategies to improve learning outcomes (Reiss, 2021; Panjwani-Charania *et al.*, 2023). In addition, these tools could promote the inclusion of students from different cultural backgrounds and create educational pathways that actively engage them in the classroom community (Salas-Pilco *et al.*, 2022). AI could also be used to translate learning materials into the native language of students with limited knowledge of the language of instruction. This approach has the potential to bridge language barriers and encourage active participation in school activities.

However, the use of AI to personalize education remains an emerging field with several unresolved challenges. Key issues include the need to train teachers to use the technology critically, the lack of specific regulations to protect the most vulnerable students and the technical difficulties of integrating AI into the educational context. Despite these limitations, AIED represents a promising area of development that has the potential to promote a more inclusive and personalized educational experience.

The Italian school system is characterized by its strong inclusive orientation, which has been shaped by decades of legislative and cultural development (Pavone, 2010). The Italian inclusive model thus provides fertile ground for integrating the potential of AI into personalized education. In a system that already values individualized teaching and learning, AI could provide additional support to address the different needs of students. For example, AI applications could help teachers to create inclusive teaching materials and tailored learning pathways, making the educational experience more accessible and engaging.

However, integrating AI into the educational context requires not only technical skills, but also targeted training to ensure that the use of AI is deliberate and pedagogically grounded. The framework presented in this paper aims to address this challenge by providing preliminary guidelines to prepare teachers for the critical use of AI. Ultimately, the aim is to promote the integration of technologies in

line with the principles of the Italian inclusive model, thus supporting equitable education that values diversity.

## **2. AI and Inclusive Teachers: a Critical Decalogue Proposal from the Course "Expert in Inclusive Processes"**

The University Professional Development Course "Expert in Inclusive Processes" (CUAP) represents a concrete response to the growing need for qualified support teachers to address the chronic shortage of such professionals, which represents a significant challenge for the Italian education system (Damiani *et al.*, 2021). The CUAP, designed and implemented by the Department of Philosophy and Education of the University of Turin with the support of the Piedmont Region, aims to fill this gap by also preparing trainers who will guide future support teachers in specialization courses (Di Masi *et al.*, 2023). This goal was pursued through an interdisciplinary and interprofessional approach involving academic institutions, regional entities, and stakeholders in the education system (Bianchini *et al.*, 2023).

The 2022–2023 edition of the CUAP focused in particular on New Learning Technologies (NLT), with an emphasis on exploring the potential pedagogical and didactic use of AI. The course aimed to prepare teachers and trainers to consciously integrate AI into inclusive education, focusing on pedagogical intent and pedagogical goals.

The use of AI in inclusive education raises critical questions, particularly with regard to its potential integration into classroom practice and its capacity to support students with disabilities and Special Educational Needs (SEN). Among the applications explored, AI could be used to develop personalized teaching mediators, such as language translation for students unfamiliar with the school language or simplified textbooks for students with cognitive impairments and learning difficulties. While these potential uses offer significant opportunities, they require critical reflection to ensure their effectiveness and alignment with educational goals.

One of the most significant outcomes of this training initiative was the development of a decalogue (Atzei *et al.*, 2023), a preliminary guide for a critical and pedagogically oriented use of AI in inclusive education. The decalogue is the result of the collaboration of CUAP participants and teachers, external experts and NLT instructors from the Specialisation Course for Support Activities, through workshops to promote dialog and co-construction of knowledge.

Among the ten principles outlined in the decalogue, a key element is the need for teachers to retain complete control over the educational process. This includes designing AI prompts, reviewing the outputs produced and adapting them to ensure that they are pedagogically meaningful and aligned with the principles of Universal Design for Learning (UDL). The decalogue emphasizes that AI should serve as a tool to support teaching, not as a substitute for the central role of the teacher, and encourages a critical and deliberate approach.

Another key principle emphasizes the need for teachers to use AI not to become technical experts, but to reflect on their pedagogical practices and develop critical and conscious methods to create inclusive teaching mediators, leveraging the potential of available technologies. The decalogue also emphasizes the importance of developing a critical understanding of the characteristics of different AI tools, evaluating their potential in relation to educational goals and reflecting on ethical aspects, such as the commercial and data-extracting nature of many devices.

This awareness can help foster an internal school debate aimed at defining operational guidelines and protocols for the responsible use of AI by staff and students. The decalogue is thus a starting point, not a definitive guide, to provide educators and teachers with orientation for testing practices that critically integrate AI into inclusive education. It does not offer a consolidated model, but rather aims to inspire training and educational pathways in which AI is seen as a tool at the service of pedagogical goals and the central role of the teacher. This initiative helps to stimulate collective reflection on the potential uses of AI and to promote educational strategies that support inclusion and value diversity.

### 3. Testing the Decalogue: integration in the New Learning Technologies Laboratories of the Support Teachers Specialization Course

The Specialisation Course for Support Activities (CSS) at the University of Turin operates in an educational context characterized by a strong commitment to school inclusion, but also by challenges that hinder its full implementation (Seitz *et al.*, 2024). At the international level, the United Nations Convention on the Rights of Persons with Disabilities (2006) emphasize the importance of ensuring quality education for all and promoting the inclusion of students with disabilities. However, in Italy, significant challenges persist, including a lack of specialized support teachers, difficulties in recruiting qualified tutors and insufficient funding models which constrain the full implementation of inclusive principles (EASNIE, 2016; 2018).

In this context, the CSS aims to train qualified teachers who are able to tackle the complex challenges of school inclusion by integrating theory and practice in a structured training pathway consisting of three main phases: theoretical classes, laboratory activities and supervised internship activities. Among the different labs offered as part of the course, the New Learning Technologies Laboratories (LabTIC) plays a central role. It promotes a teaching approach that uses digital devices to promote inclusion. The theoretical framework of LabTIC is based on the principles of UDL (Cast, 2018), with a focus on the design of inclusive teaching materials.

One of the central aspects of the work in LabTIC is the practical application of operational insights based on the UDL principles (Guastavigna, 2020). These insights are intended to support teachers in the design and development of inclusive teaching materials tailored to the specific needs of the school context. Activities being explored in the labs include the creation of interactive images and videos using software such as LUMI Education, Genially and Thinglink; the use of tools such as DylanTextTools, developed by the National Research Council (CNR) and based on the principles of controlled writing to simplify texts and make them more comprehensible (De Mauro, 1980; Piemontese, 1996); and the use of software for graphical representation of knowledge such as CMAPTools and XMind, which adhere to established theoretical models in the field (Guastavigna, 2015).

In the 2023/2024 academic year, the decalogue developed in CUAP was adopted as a guide for experiments on the use of AI within LabTIC, which focus specifically on the training of secondary school support teachers. The ten principles of the decalogue guided the trainers in developing activities aimed at promoting critical and informed use of AI to create inclusive teaching materials. In particular, AI was tested in activities such as controlled writing and storytelling, where teaching materials were enriched with images generated by AI applications to enhance their explanatory potential.

For example, text simplifications were carried out using the Diffit application, an AI tool designed to produce graduated simplifications based on the linguistic competencies defined in the American education system. The materials created were analyzed, revised and critically reflected upon by the CSS participants and compared to guidelines from the text simplification literature to identify strengths and weaknesses in the use of AI for controlled writing.

In the context of storytelling, AI was used to transform textbook content into narrative formats providing teaching materials that convey disciplinary content while appealing to different learning styles. In addition, AI was used to generate ideas for dramatizations, such as dialogs between historical figures discussing important disciplinary topics (e.g., two political leaders discussing the causes of World War I). The final outcomes, which were reviewed and validated by the teachers, aimed to present disciplinary content through dialogs and narratives.

The experiments confirmed the core ideas of the decalogue, including the need to maintain complete control over the educational process by reviewing and validating AI outcomes to ensure their reliability and alignment with educational objectives. Furthermore, while AI-based technologies have been shown to contribute effectively to the development of educational materials, they still have significant limitations when it comes to handling complex content. A notable example is the concept maps created with Algor Education, which were often incomplete or inconsistent with established theoretical models (Novak & Gowin, 1984; Buzan, 1993; Guastavigna, 2015). In addition, there were

concerns that students might use such tools in a compensatory way, delegating the process of creating maps entirely to the AI and thus hindering the development of essential skills.

CSS instructors and participants collectively addressed the challenges of integrating AI into classroom practice and sought to combine the potential of technology with traditional and proven methods to ensure an inclusive and pedagogically meaningful approach. The application of the decalogue within CSS thus represented a significant opportunity to test and strengthen the critical integration of AI into inclusive teaching. This approach not only helped to train more aware teachers, but also encouraged collective reflection on the potential and limitations of digital technologies and stimulated discussions on the need to create increasingly aware educational pathways aimed at developing critical thinking to value diversity and support inclusion.

## 4. Conclusions

The emergence of AI represents a significant turning point in the educational landscape. It offers new opportunities and at the same time presents us with unprecedented challenges. The ability of AI to support teachers in personalizing learning pathways that promote school inclusion underlines its transformative potential, but also requires deep reflection to ensure its conscious and ethical use.

In this context, the CUAP and CSS are important initiatives to address this challenge. Both training programs aim to promote the effective and pedagogically meaningful use of AI in inclusive education and contribute to the development of teachers who can value diversity and uphold educational equity. The results of the CUAP are particularly noteworthy. They culminate in the development of a critical decalogue for the use of AI in inclusive education. This tool provides general principles to guide educators and trainers towards a conscious and pedagogical approach to AI integration. It emphasizes the importance of maintaining control over the educational process, validating the outcomes generated by the technologies and reflecting on the ethical implications of AI use. The CSS, in turn, has tested the practical application of the decalogue in LabTIC and provides concrete examples of how AI can be used to create inclusive teaching materials, such as narrative content and simplified texts.

However, the experiments also revealed some significant limitations in the use of AI. For example, the concept maps created by the AI tools proved to be incomplete or contradicted established pedagogical paradigms. This shows that teachers need to intervene critically to a significant extent to adapt and refine the outputs generated by these technologies. This underlines the crucial role of the teacher in the educational process, a central principle of the decalogue.

A clear limitation of the decalogue lies in its abstract and general nature. To effectively put these principles into practice, universities, schools and educational institutions must work synergistically to develop specific training activities that enable teachers to acquire practical skills for the critical use of AI. This requires a concerted effort to develop training programs that enable educators to deal with the challenges and opportunities of these technologies.

The prospects for future research are manifold. It is necessary to explore the development of training programs for teachers on the use of AI to create a framework that improves school inclusion, accessibility and equity in the education system. In addition, it is important to further investigate how students use AI to complete school assignments to better understand the risks and opportunities of these practices for the development of their skills and autonomy.

These initiatives and reflections are part of a broader debate on the critical use of AI in education. They contribute to the development of strategies that balance technological innovation with established pedagogical principles to support an education system that is increasingly inclusive and accessible to all.

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