

The Importance of Integrating Assistive Technologies: Reflections

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Abstract

The integration of students with disabilities is a fundamental challenge for the contemporary education system. This article analyses the role of assistive technologies as enabling tools to promote school inclusion and improve the learning experience of students with special educational needs. Various specific devices and software are examined, as well as innovative pedagogical strategies that allow teaching content to be adapted to different needs. Through a critical review of the literature and case studies, the concrete benefits of the integrated use of assistive technologies are highlighted: greater autonomy, active participation and improved cognitive and relational skills. The article concludes with operational recommendations for teachers and educational institutions to promote an inclusive environment that is truly accessible to all.

Keywords: *Integration, Inclusion, Assistive Technologies, Inclusive Learning.*

Introduction

In recent decades, attention to the inclusion of pupils with disabilities in schools has taken on a central role in the education system, recognised as a fundamental right by the Italian Constitution and by national and international regulations. Italy, with a long tradition of legislation dating back to Law 517/1977, has been a forerunner in adopting an inclusive model that sees integration as a basic element in ensuring equal opportunities for learning and social participation. However, despite legislative and pedagogical progress, numerous critical issues remain related to educational continuity, the training of support teachers, and the availability of specialised resources, including technological ones. The latest ISTAT report on the 2023/2024 school year, *“Improved provision of specialised support teachers, but delays in inclusion”*, highlights the need to improve the implementation of assistive technologies and teaching tools, as well as to overcome the architectural barriers still present in Italian schools.

Assistive technologies are a key element of inclusive education, not only because they help to overcome the limitations arising from disability, but also because they promote autonomy, active participation and academic success for students with special educational needs. These tools include both specific devices dedicated to different types of disability (sensory, motor, cognitive) and common digital technologies such as tablets, multimedia whiteboards and adapted educational software. The integrated use of these technologies, combined with innovative teaching methods such as cooperative learning, metacognitive teaching and the flipped classroom, allows for a personalised educational experience, valuing diversity and

promoting real inclusion. This article aims to critically analyse the role of technology in school inclusion, examining both current legislation and best practices. The aim is to provide practical guidance for teachers and educational institutions so that they can create accessible and motivating learning environments that are tailored to each student's potential, consolidating an inclusive educational model that is aligned with contemporary challenges.

The annual report on disability entitled '*School inclusion of pupils with disabilities*' highlights the following:

1. *Increase in students with disabilities*: +26% (+75,000) since the 2018/2019 school year. In numerical terms, in the 2023/2024 school year, there will be 359,000 pupils in schools of all levels (an increase of over 25% in the last ten years), mostly in primary and lower secondary schools, with a majority of males.
2. *Types of disability* (values per 100 pupils). The most common problem is intellectual disability (40% of students), followed by psychological development disorders, learning and attention disorders. Twenty-eight per cent have problems with autonomy (in communication, mobility, etc.).
3. *Specialised support teachers*. There are 246,000 teachers working in state and non-state schools, an increase from 63% to 73% in four years.
4. *Non-specialised teachers*. There are more than 66,000 teachers without specific training (27%), a decrease from 30% to 27% compared to the previous year. The phenomenon is more prevalent in schools in northern Italy.
5. *Discontinuity in the pupil-support teacher relationship*. 57% of pupils have changed teachers compared to the previous year (the percentage rises to 61% in lower secondary schools and 69% in nursery schools).
6. *Teaching hours inside and outside the classroom*. Pupils spend most of their time with their classmates in the classroom. However, only 31% of pupils receive 'support' for the whole class, as for more than half of the pupils involved, it mainly involves the pupil with disabilities.

Furthermore, the document states that in 31% of cases, there is a lack of supplementary teaching aids and structural deficiencies in buildings. However, we must bear in mind that the report refers to a limited period of time. But what is being done about these shortcomings? In Italy, the school system is committed to promoting the inclusion of all students, particularly those with disabilities. This daily mission requires teachers to adopt personalised teaching approaches to meet the needs of each pupil. The aim is to ensure that every student, whether they have a disability, a specific learning disorder, other developmental difficulties, a socio-cultural disadvantage, or are able-bodied, can reach their maximum learning potential.

In this new era, the learning environment is a dynamic and interconnected space, where technology acts as a bridge between students, teachers, knowledge and tools. The digital classroom promotes the creation of a network of interactions that allows for the circulation, construction, debate and reworking of information and educational artefacts.

This environment is not just a physical place, but a complex ecosystem that integrates online and offline methodologies, books, voice, computers and network resources, recognising digital language as a basis for the production of new ideas and projects, in a reciprocal relationship with other human and analogue languages. The COVID-19 pandemic, while exacerbating educational inequalities due to distance learning, has paradoxically offered a unique opportunity for education reform. It has highlighted the need for greater connection between schools, families and communities, and has accelerated the process of improving inclusive digital education, demonstrating how preparedness in this area can increase the resilience of the education system in the face of unexpected crises.

1. The importance of assistive technologies

The rapid and growing spread of digital solutions in everyday life has made a systemic change in the education sector essential. This change is not limited to the mere adoption of new tools, but implies a profound digital transformation that must permeate all levels of education systems, with a particular emphasis on inclusion. Digital technologies are no longer an option, but a key tool for promoting equity in educational opportunities, ensuring that no student is left behind. AT is considered an essential tool for promoting equity in educational opportunities. Access to these technologies is not optional, but a genuine right, recognised by legislation such as the Stanca Law (No. 4 of 2004) in Italy, which established the obligation for public administrations (including schools) to purchase accessible software and IT tools.

The underlying idea is that what is designed to meet the needs of a person with a disability can be useful to everyone. Assistive technologies are part of this 'Universal Design for Learning' (UDL) approach, which aims to create flexible and accessible learning environments for every student by reducing barriers from the outset of the educational design process.

The UDL theory was developed by the Centre for Applied Special Technology (CAST), a non-profit research and development organisation based in the United States. There are three key principles of UDL:

- *Principle I: Multiple Means of Engagement:* This principle involves providing different ways to stimulate students' interest and motivation. This translates into offering choices in learning activities, promoting collaboration, and designing tasks that are relevant, challenging, and allow students to find their own purpose in learning.
- *Principle II: Multiple Means of Representation:* This involves presenting information in different formats to accommodate students' diverse learning styles and sensory preferences. Practical examples include the use of printed text, audio, diagrams, images and materials with different levels of reading, ensuring that key information is perceptible to all without additional effort.
- *Principle III: Multiple Means of Action and Expression:* This principle allows students to demonstrate their knowledge and skills in flexible ways. Multiple options for assignments can be offered, such as creating websites, oral or video presentations, or research papers, and the use of word processing or speech synthesis software.

The integration of UDL with technology is essential, as technology is an essential resource for providing these multiple modes of access, engagement, and expression. It allows for customisation and adaptation that go beyond the limits of traditional 'assistive technologies', incorporating accessibility from the outset. Understanding UDL as a universal inclusive design philosophy reveals a broader perspective. This approach does not merely provide specific tools for disabilities, but is committed to creating environments where accessibility is an intrinsic and default feature. This vision benefits a wide range of students, including multilingual students, those with temporary limitations, or simply those with different learning preferences. The result is an environment that normalises diverse learning paths, reducing the stigma often associated with "special" tools or methods and promoting a sense of belonging for all. Numerous studies and established practices demonstrate the effectiveness of Assistive Technology in the school context. They compensate for and replace deficient functions. For students with motor disabilities, eye-tracking systems or simplified keyboards allow them to write and communicate despite physical difficulties.

For those with dyslexia or dysorthography, speech synthesis and automatic correctors reduce the effort involved in reading and writing, allowing them to focus on content rather than form. The use of AT allows students to perform tasks that would otherwise be impossible or very tiring in a more independent way, reducing feelings of inadequacy and increasing confidence in their abilities.

This has a positive impact not only on learning but also on the emotional and social sphere, encouraging greater participation in school life. Tools such as digital concept maps promote learning and socialisation, helping students with SLDs to organise information, while Augmentative and Alternative Communication (AAC) supports students with communication difficulties, allowing them to express their thoughts and interact with their peers.

AT thus becomes a mediator for cooperative activities and a tool for overcoming isolation. Technology allows teachers to create tailor-made learning paths for each student, adapting materials and activities to their specific needs.

Artificial Intelligence (AI), for example, can analyse progress and suggest personalised pathways, offering dynamic and flexible support. We can say that assistive technologies have evolved from simple aids to real drivers of change in teaching, promoting a school where diversity is not an obstacle but a resource, and where every student has the opportunity to reach their maximum learning potential. Furthermore, the integration of assistive technologies with innovative teaching methods is a fundamental approach to creating a truly inclusive and effective learning environment.

By combining cutting-edge technological tools with targeted pedagogical practices, we can enhance each student's learning, overcoming barriers and promoting autonomy. Cooperative learning is based on collaboration between students to achieve a common goal.

Assistive technologies act as a bridge, facilitating this collaboration even for students with communication, cognitive or motor difficulties. When it comes to collaborative tools, online platforms such as Google Docs or Miro allow everyone to contribute to a project, write texts or create concept maps in real time. A student with dyslexia can use speech synthesis to read a document, while a classmate with a motor disability can contribute using voice recognition software. For students who use Augmentative and Alternative Communication (AAC), dedicated apps allow them to actively participate in group discussions, expressing their thoughts and interacting with their peers without language barriers.

Assistive technologies support metacognitive teaching in a dynamic way, as it aims to teach 'how to learn', helping students become aware of their own learning processes.

The use of mind mapping or schematisation software helps students visualise their thought processes and organise information. This not only facilitates learning, but also makes them more aware of the strategies that work best for them. In addition, quiz applications or interactive exercises provide instant feedback, allowing students to correct mistakes and reflect on their learning path in real time. Among the most important methodologies used in the classroom is the flipped classroom, which reverses the traditional model: theoretical lessons are carried out at home, independently, often through videos or multimedia materials, while class time is dedicated to practical, collaborative or in-depth activities. For students with SEN, the home study phase can be facilitated by accessible teaching materials. Videos can have subtitles or be accompanied by voice synthesis, while texts can be enriched with images, diagrams and automatic readers.

The role of the teacher is also fundamental in this methodology. In the classroom, the teacher can focus on individual needs, providing personalised support and guiding practical activities. Assistive technologies become tools for personalising learning, allowing teachers to interact more deeply with students who need more support. The combination of these methodologies and technologies transforms the classroom into a dynamic and flexible environment where each student is at the centre of their own learning path. We move from a model of "inclusion" as simple participation to a model of 'equity', where every student has the tools and support they need to thrive.

Conclusions

The versatility of digital tools for cross-cutting inclusion is a key aspect. Digital tools, such as shared presentations, video storytelling, self-correcting quizzes, interactive maps and knowledge games, can be adapted to different subjects and learning objectives. This adaptability allows for the creation of a consistently inclusive and engaging learning environment across the curriculum, promoting cross-curricular skills and a holistic educational experience for all students. The transition to an inclusive digital learning environment involves a profound transformation of the role of the teacher. It is no longer just a 'lecturer' who imparts knowledge, but a 'designer' who plans and manages a complex learning experience. This evolution is not simply linked to the use of new tools, but to a fundamental rethinking of the pedagogical approach. The availability and integration of digital tools that facilitate active and collaborative learning require teachers to shift their focus from mere content delivery to the design, facilitation and management of rich and flexible learning pathways.

This change implies new skills in pedagogical design, technology integration and student support. The successful implementation of inclusive digital environments therefore depends on a profound transformation of the identity and professional development of teachers, who must go beyond the transmission of knowledge to design interactive and stimulating learning paths that enable students to construct their own understanding and collaborate effectively. An inclusive learning environment is a rich and complex space for knowledge, where students can express and orchestrate their knowledge, skills and competences. Collaboration is goal-oriented, and the negotiation of meanings leads to the co-construction of new knowledge. This environment consists of three interrelated dimensions: pedagogical-organisational, methodological and relational.

The Pedagogical-Organisational Dimension deals with the organisation of physical and digital space, as well as learning times. Physical furnishings should be arranged in such a way as to encourage discussion and the exchange of ideas, and teaching materials must be accessible to all students. In the digital context, this translates into the preparation or selection of appropriate digital resources that are accessible and allow for individualised learning paths. It is crucial to respect each student's pace of work and to allow time for dialogue and discussion, protecting the time needed to complete activities from the rigid school timetable.

The Methodological Dimension concerns the use of active and participatory methodologies. Teachers must employ approaches such as *cooperative learning*, *peer education* and discussion-based teaching, which make students the effective protagonists of the learning process. Digital tools are particularly effective in supporting distance *cooperative learning*, as demonstrated by the use of collaborative platforms. *Learning by doing* is also fundamental, focusing on 'doing together' through workshop dynamics and collaborative tasks, which allow students to put their different individual skills into practice.

The Relational Dimension explores the emotional climate of the classroom and the construction of a learning community. An inclusive classroom is open, welcomes all its members, recognising their equal value and dignity, and values each person's unique characteristics, putting them at the service of the common good. In the digital context, this means teaching digital citizenship so that students learn to respect the rules and safeguard their rights in a virtual environment. Collaboration is fostered by the collective construction of digital materials, where each student, with their unique characteristics, becomes an indispensable element of the collective, strengthening a sense of shared responsibility.

The primary objective should be to support the design and implementation of learning environments that, through the strategic use of technology, are not only accessible to all but also intrinsically motivating. This includes a particular focus on students with Special Educational Needs (SEN) and Specific Learning Disabilities (SLD), for whom digital technologies are a fundamental resource for ensuring high-quality education and school

inclusion. The continuous updating of teachers' teaching and technological skills is, in fact, a key element in making the most of the potential of technology and AI in education, promoting greater educational equity and inclusiveness (Selwyn, 2016).

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