Introduction

Ivan Traina, Katerina Mavrou, and Evert-Jan Hoogerwerf

In recent years, there have been significant developments in the education of persons with disabilities. Currently, many education systems in European countries and globally are heading towards increasingly inclusive models of education. Very often these developments are the result of substantial legislative changes that stimulate the advancement of inclusive approaches to education. The role of technology in the empowerment of learners with disabilities and the enhancement of the entire educational environment is key, but it is not fully explored in many schools.

Inclusive education is about how we develop and design schools, classrooms, programmes, and activities so that all students can learn and participate together. An inclusive education environment is one that supports all of its students to access, participate in, and benefit from an appropriate education, with values of equity and respect for diversity, that is recognised as a basic human right by a number of instruments of the United Nations (UN) such as the Universal Declaration of Human Rights, the UN Convention on the Rights of the Child, and the UN Convention on the Rights of Persons with Disabilities (UNCRPD). Therefore, every school is inclusive if it supports its students to fulfil their full potential, educationally, socially, and in all aspects of their development.

Research suggests the use of digital tools and resources as powerful tools in teaching and learning (Higgins, Xiao & Katsipataki, 2012). The continuing development in the availability of technology in schools and society has the potential to facilitate and promote inclusive practice (European Agency, 2013). The United Nations' Educational, Scientific and Cultural Organization (UNESCO, 2011) notes that the use of technology in education facilitates personalised learning, as it enables flexible curriculum development and assists learners with different needs to participate as equals in the learning experience.

As matter of fact, nowadays technology plays an important role in helping persons with disabilities to be involved in education processes. Therefore, any educational environment, whether belonging to formal, non-formal, or informal education, needs to be ready to face the challenges posed by the use of technological solutions for supporting persons with disabilities who want to participate in and benefit from teaching and learning. As with many other sectors, the far-reaching digitalisation of society is affecting the educational sector.

The overall educational experience is changing, including the way people participate in education and learn.

Modern technology has the potential to increase the opportunities to overcome the barriers that persons with disabilities would otherwise experience. On the other hand, digitalisation, if not designed inclusively, can mask the risk of marginalisation of groups, who instead of being empowered, face new barriers. In the case of persons with disabilities, the lack of access to appropriate technological assistive solutions is such a risk. The gap in access to ICT-based Assistive Technology (ICT-AT) is generally known as the digital divide and frequently follows other inequalities, including those related to gender, class, and income.

Because of the undoubted importance that ICT-AT has for persons with disabilities, the development of digital skills is fundamental. Digital literacy is important for all citizens in the digital society and so is the right of persons with disabilities to fully access ICT-AT solutions.

Many international and national bodies highlight the need to actively promote the use of ICT-AT as potential human rights (UNESCO, 2016). This is also stated in many international documents, such as the International Telecommunications Union (2013), the Digital Agenda for Europe (2010), and the UN Convention on the Rights of People with Disabilities (Assembly, 2007). Moreover, the UN Member States signing the convention have an obligation to support the promotion of AT and consequently the provision of quality training.

The term Assistive Technology means different things to different people and covers "technologies, equipment, devices, apparatus, services, systems, processes and environmental modifications used by disabled and/or elderly people to overcome the social, infrastructural and other barriers to independence, full participation in society and carrying out activities safely and easily" (Hersh & Johnson, 2008, p. 196). The term is also connected to the notion of accessibility, as it is related to the environmental characteristics of the system input and output which enable particular users to access and use all the facilities of the system (Federici et al., 2005). To be effective, accessibility needs to be combined with usability (Leporini & Paternò, 2002). This is the ability of the system to carry out the intended function(s) or achieve specified goals effectively, efficiently, and with satisfaction when used by particular (groups of) users in their particular context (Federici et al., 2005).

The definitions of AT provided are many, from the most recent ISO 9999 (2016) to the World Health Organization (WHO, 2001, 2004, 2015) versions, each representing an effort to capture the range of technology advancements, the range of AT uses, and the range of stakeholders and interests involved. However, in order to define AT or ICT-AT for inclusive education (Campbell, Milbourne, Dugan & Wilcox, 2006), it is important to answer some questions before developing inclusive education environments, such as:

- How to identify the needs for the adoption of ICT-AT?
- How to identify appropriate ICT-AT?

- How to organise the training of learners with disabilities to use technologically innovative solutions?
- What is the political framework of reference in the field of accessibility of ICT-AT?

Despite the great and growing importance of ICT-AT, it should be recognised that attitudinal and other changes are also required to support their use for promoting full inclusion and participation of people with disabilities. In the past, a medical model was generally applied to disability (Gary, 2005). This was generally based on consideration of deficits or deficiencies, leading to assumptions that it was the disabled person's condition that resulted in any difficulties, disadvantage, or discrimination they experienced (WHO, 2001).

Nowadays, deriving from the principles of later models and approaches such as the social model, the capability approach, and contributions from the field of Disability Studies, the human rights approach to disability has been put forward (Traina, 2017). This approach focuses on person's rights and society's responsibilities to include persons with disabilities and considers the difficulties, disadvantage, and discrimination they experience to be the result of attitudinal, social, infrastructural, and other barriers (Johnstone, 2001; Swain, French & Cameron, 2003).

A number of factors including campaigning by organisations of persons with disabilities have led to recognition of the rights of literally "disabled" people to participate fully in all activities and access all benefits of society available for all. Nevertheless, to date many people worldwide are disabled by inaccessible technology or do not have access to assistive technology-based solutions that could help them to participate on an equal footing in modern society.

In addition, it seems that in European countries, there are various and different approaches to the education of people with disabilities ranging from more segregating practices to full inclusive education. For example, some countries have special schools (e.g. Austria and Germany), other mixed-method schools with special classrooms (e.g. Ireland, Cyprus, and Finland), and other mainstream schools (e.g. Italy),[1] as education for all is not necessarily linked with obligatory mainstream systems for all disabled students (Ebersold, Schmitt & Priestley, 2011).

As stated by the OECD, successful school systems are "those that perform above average and show below-average socio-economic inequalities – provide all students, regardless of their socio-economic backgrounds, with similar opportunities to learn" (OECD, 2010, p. 13). Consequently, in order to be successful in supporting all students with disabilities equally and effectively, it is pertinent to transform the whole educational context to an inclusive barrier-free learning environment that provides equal learning opportunities for all.

This requires efforts at all levels and in all domains, including the professionals' training, the way the curricula are designed and delivered, the ICT-AT support provided, and school-family-community partnerships.

This book is written for a broad range of readers, mainly researches, academics, and university students, but also professionals who directly or indirectly support

children and young persons with disabilities in educational settings. The book gives an insight into the issues at stake when it comes to including ICT-AT in programmes and activities that aim at the empowerment of the pupils and the enhancement of the entire educational ecosystem. Building upon the heritage of international projects, mostly co-funded by the European Commission, it provides access to practices and tools for those who have decided to pick up the ICT-AT challenge in the complex world of education. Hence, the book is an effort to contribute to current scientific and empirical knowledge on how collaborative project and network outcomes can be implemented in practice and may have an impact on the improvement of the education of children with disabilities, especially regarding inclusive education in the digital era. The experiences reported are grounded on empirical evidence-based research, as well as the use of research work as a reflective process for improving policies and practices in AT. In accordance with what Brozo (2014) stated, "best practice implies a significant evidentiary basis of effectiveness for the practice", the book describes policies, recommendations, and instruments that allow the enhancement of educational environments through innovation-driven growth and the adoption of technological solutions.

The content provided was identified thanks to the contribution of many experts with different backgrounds, including researchers and professionals from fields such as information and communications technology, engineering, education, psychology, and rehabilitation, as well as people with disabilities, their families, caregivers, and the administrative staff of the different organisations involved.

Chapter 1 provides a synthetic framework of policy and legislative documents in relation to inclusive education in the digital era. The chapter refers to the main European and international legislation relevant to ICT-AT in education.

In Chapter 2, a self-assessment tool to assess the performance of schools in supporting learners with disabilities with appropriate AT intervention in the digital era is outlined. The theoretical framework of the tool is analysed followed by examples of case studies of schools in which it was piloted, and lessons learnt from these experiences. The tool can be used by school teams to assess the state of the art as well as to set objectives and design pathways for improvement.

Chapter 3 is a collection of independent case studies and research studies focused on innovative ICT and AT solutions in educational environments. The aim of the chapter is to give readers some examples of technology-driven innovation in educational settings matured during research activities.

Chapter 4 provides high-level tools for developing curricula and learning programmes aimed at training AT skills to professionals and students with disabilities to enhance their ICT-AT competency levels. This chapter is relevant for readers responsible for training activities and professional development.

The last chapter of the book broadens the picture and reflects on the barriers that people with disabilities meet in education and beyond, and elaborates on digital empowerment as a wider societal challenge.

Should you require more information, please refer to the footnotes and list of references at the end of each chapter.

Note

1 Data retrieved from: (a) Special Needs Education in Europe Report by the European Agency for Development in Special Needs Education. Available at: https://www.european-agency.org/sites/default/files/special-needs-education-in-europe_sne_europe_en.pdf (b) European Agency for Special Needs and Inclusive Education. Available at: https://www.european-agency.org/country-information

References

Assembly, U. G. (2007). *Convention on the Rights of Persons with Disabilities: Resolution/ Adopted by the General Assembly.* New York: UN General Assembly.

Brozo, B. (2014). Evaluation Report on the ELINET Opening Conference in Vienna, February 2014.

Campbell, P. H., Milbourne, S., Dugan, L. M., & Wilcox, M. J. (2006). A Review of Evidence on Practices for Teaching Young Children to Use Assistive Technology Devices. *Topics in Early Childhood Special Education, 26*(1), 3–13.

Digital Agenda for Europe. (2010). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. (COM(2010) 245 final).

Ebersold, S., Schmitt, M. J., & Priestley, M. (2011). Inclusive Education for Young Disabled People in Europe: Trends, Issues and Challenges. A Synthesis of Evidence from ANED Country Reports and Additional Sources. ANED -VT/2007/005. Available at: http://www.disability-europe.net/downloads/72-aned-2010-task-5-education-final-report-final-2-0 [Accessed 16 July 2018].

European Agency for Development in Special Needs Education. (2013). *Information and Communication Technology for Inclusion – Developments and Opportunities for European Countries* (A. Watkins ed.). Odense: European Agency for Development in Special Needs Education.

Federici, S., Micangeli, A., Ruspantini, I., Borgianni, S., Corradi, F., Pasqualotto, E., & Olivetti Belardinelli, M. (2005). Checking an Integrated Model of Web Accessibility and Usability Evaluation for Disabled People. *Disability and Rehabilitation, 27*(13), 781–790.

Gary, A. L. (2005). *Encyclopedia of Disability.* 5 Vol. Thousand Oaks, CA: Sage Publications.

Hersh, M. A., & Johnson, M. A. (2008). On Modelling Assistive Technology Systems Part I: Modelling Framework. *Technology and Disability, 20*(3), 193–215.

Higgins, S., Xiao, Z., & Katsipataki, M. (2012). *The Impact of Digital Technology on Learning: A Summary for the Education Endowment Foundation.* Full Report. Durham, UK: Education Endowment Foundation and Durham University.

International Telecommunications Union. (2013). The ICT Opportunity for a Disability-Inclusive Development Framework. Available at: https://www.itu.int/en/action/accessibility/Documents/The%20ICT%20Opportunity%20for%20a%20Disability_Inclusive%20Development%20Framework.pdf [Accessed 1 July 2015].

ISO. (2016). Assistive Products for Persons with Disability – Classification and Terminology: ISO 9999:2016. Available at: https://www.iso.org/standard/60547.html [Accessed 11 December 2018].

Johnstone, D. (2001). *An Introduction to Disability Studies.* 2nd Ed. London, UK: David Fulton Publishers Ltd.

Leporini, B., & Paternò, F. (2002, October). Criteria for Usability of Accessible Web Sites. In ERCIM Workshop on User Interfaces for All (pp. 43–55). Berlin, Heidelberg: Springer.

OECD. (2010). *PISA 2009 Results: What Makes a School Successful? – Resources, Policies and Practices* (Volume IV). Paris: OECD Publishing. Available at: www.oecd.org/pisa/pisaproducts/48852721.pdf [Accessed 21 March 2018].

Swain, J., French, S., & Cameron, C. (2003). *Controversial Issues in a Disabling Society.* Buckingham, UK: Open University Press.

Traina, I. (2017). Social Inclusion through Participatory & Emancipatory Approaches. Implementing Active Citizenship & Socially Innovative Actions in the Framework of Human Rights Model of Disability. Lambert Academic Publishing, ISBN-13: 978-3-659-71930-1.

UNESCO. (2011). Consultative Expert Meeting Report. Accessible ICTs and Personalized Learning for Students with Disabilities: A Dialogue among Educators, Industry, Government and Civil Society. 17–18 November 2011. UNESCO Headquarters, Paris. Paris: UNESCO.

UNESCO. (2016). Digital Empowerment. Access to Information and Knowledge using ICTs for Persons with Disabilities. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000244543

World Health Organization. (2001). International Classification of Functioning, Disability and Health (ICF), Geneva, CH: WHO. Available at: http://www.who.int/classifications/icf/en/ [Accessed 03 March 2018].

World Health Organization. (2015). Global Disability Action Plan 2014–2021. Better Health for All People with Disability. Available at: http://apps.who.int/iris/bitstream/handle/10665/199544/9789241509619_eng.pdf;jsessionid=9FD54CB60B6C772EDAA684EFC1236C53?sequence=1

World Health Organization Centre for Health Development. (2004). *Ageing and Health Technical Report Volume 5: A Glossary of Terms for Community Health Care and Services for Older Persons.* Geneva, CH: WHO.