

Transforming Education in a Digital World to Enable Inclusive Learning Experiences

A think piece for education and technology stakeholders



EUROPEAN AGENCY
for Special Needs and Inclusive Education



INCLUSIVE
DIGITAL EDUCATION

TRANSFORMING EDUCATION IN A DIGITAL WORLD TO ENABLE INCLUSIVE LEARNING EXPERIENCES

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European Agency for Special Needs and Inclusive Education



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FOREWORD



The potential of information and communication technology (ICT) to support inclusive education is deeply ingrained in the thinking of the European Agency for Special Needs and Inclusive Education (the Agency). It has been a major element of Agency activities since 1999.

The Agency's ICT in Special Needs Education activity, conducted in 2001, provided an overview of policies and practices across Europe. It considered national and regional policy levels and teacher and learner levels, as well as issues of access to ICT.

Also in 2001, this was built upon through the European Network of Excellence in Information Society Technologies for Special Educational Needs (SEN-IST-NET). This provided a virtual library which included an extensive resource guide, case studies, a glossary of terms in 14 languages and examples of innovative use of ICT to support special needs education.

Throughout the years, many Agency activities included this knowledge. It became a focus again in 2010, when the Agency and the United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Information Technologies in Education (IITE) collected and analysed detailed case studies of the use of [ICT in education for people with disabilities](#).

This was closely followed by Accessible Information Provision for Lifelong Learning ([i-access](#)). i-access focused on educational content and relevant information which is conveyed using ICT. This activity produced clear recommendations to support the provision of accessible information for lifelong learning for all learners – agreed upon by key stakeholders for lifelong learning and accessibility experts.

[ICT for Inclusion](#) (2012–2013) provided an update to the Agency's 2001 activity, focusing on policy and practice in the field.

The Agency co-ordinated the [ICT for Information Accessibility in Learning](#) activity to complement this study. This comprised a multi-disciplinary network of international partners covering both education and ICT (UNESCO, the DAISY Consortium, the International Association of Universities, the Global Initiative for Inclusive ICTs (G3ict) and European Schoolnet). The activity aimed to raise awareness of accessible information provision for learning and produced open-source guidelines to support organisations in providing accessible information.

In 2014, the Agency collaborated with UNESCO and G3ict to develop a detailed [Model Policy for Inclusive ICTs in Education for Persons with Disabilities](#).

The COVID-19 pandemic further highlighted the relevance of ICT – not just its existence, but its implementation in learning environments, issues of access and necessary skills for both teaching professionals and learners. The [Building Resilience through Inclusive Education Systems](#) activity showed that access to learning presents a challenge, especially for vulnerable learners. It highlighted that ICT's potential role in overcoming this challenge cannot be ignored.



Most recently, the [Inclusive Digital Education](#) activity outlined the current status of technology in learning from the perspective of learners, teachers and educational institutions, as well as national and regional policy levels.

Throughout the years, terminology and concepts have developed and transformed, but the course has been steady. The link between education for learners vulnerable to exclusion and the opportunities technology can bring to ensure inclusion in education has been a constant.

In line with this, this think piece considers the developments in thinking around inclusive education systems and digital technology separately at first. It then aims to show how the two issues are deeply interlinked and must be considered together.

This think piece presents the changes in thinking and concepts around inclusive education and developments in digital technology, stressing the influence of digital advancements on teaching and learning opportunities. It then demonstrates how inclusive education and digital technology are interconnected and have reached a point where the successful transformation of inclusive education systems depends on successful digital transformation.

Achieving this transformation requires a holistic approach in future developments in both fields, considering the synergies of developments and considering all relevant policy areas, policy levels and stakeholder groups. Transforming education in a digital world to enable inclusive learning experiences requires recognition of these synergies and dependencies, which must be explored and acted upon in research, development, practice and political decision-making in both the education and ICT sectors.

This think piece is therefore addressed to both stakeholders in the education field, who develop and implement policy around learners vulnerable to exclusion, and technology stakeholders developing new solutions. It aims to provide insight into the development of concepts from each perspective and demonstrate how transformation in both areas will remain interdependent.

Cor Meijer

Director of the European Agency for Special Needs and Inclusive Education



INTRODUCTION



Quality issues within educational experiences and inclusion are directly linked. The [United Nations Sustainable Development Goal 4](#) clearly asserts this: ‘Quality education and lifelong learning opportunities for all are central to ensuring a full and productive life to all individuals and to the realization of sustainable development’ (United Nations Statistics Division, no date).

However, the realisation that education must be transformed from a privilege for the few to a fundamental right for all only gradually emerged over several centuries. The pace of change in thinking of inclusive education as every learner’s right pales in comparison with the speed of technological progress. From the first photograph in the 1820s, to the first telegraph in 1844, and the first telephone call in 1876, nowadays a person can have millions of images, notifications and communications at their fingertips almost instantly on a tiny device that can fit their hand or wrist.

This access to information – and especially the digital transformation (digital solutions becoming ingrained in systems) – is increasingly shaping how we interact and learn within our society. The developments in and the context of the field of education are interdependent on the developments in the digital world.

This think piece presents the developments within both inclusive education systems and digital technology. It aims to demonstrate how these are interconnected and have reached a point where the successful transformation of inclusive education systems depends on successful digital transformation.

The piece concludes by considering what this system transformation would entail. It invites further thinking from experts and stakeholders from both the education and technology fields.

This paper’s perspective is based on the vision for inclusive education systems of the European Agency for Special Needs and Inclusive Education (the Agency), in which:

All learners of any age are provided with meaningful, high-quality educational opportunities in their local community, alongside their friends and peers (European Agency, 2022a, p. 1).

Within this vision, this piece addresses key issues of inclusive education to be considered by both ICT and education professionals and policy-makers.



THE JOURNEY TOWARDS INCLUSIVE EDUCATION SYSTEMS



This section reflects on the changes and developments in thinking around inclusive education. Since the founding of the Agency – formerly the European Agency for Development in Special Needs Education – in 1996, key conceptual changes have moved from special educational needs, to special needs education and inclusive education, to the consideration of intersectionality.

The Agency is an agent for change and policy development in the field of inclusive education. Maintained by 31 European member countries, and in collaboration with European institutions and international partners such as UNESCO, its mission is to improve the quality and effectiveness of inclusive provision for all learners.

Establishing access to education

In the 18th century, most of the European population was excluded from education due to characteristics such as origin/ethnicity, religion, socio-economic status or gender. At the same time, the 18th century marked a growing optimism in pedagogy and experimentation with methods that served learners who had not previously been considered for educational opportunities. The development of sign language and different haptic/tactile forms of communication opened up educational opportunities in special institutions for deaf and blind learners. The medical profession led the movement to further extend these opportunities to learners with hearing or visual impairments.

In the first half of the 19th century, the first institutions for people with intellectual disabilities were created. Viewed at the time as an educational experiment, they can be considered as the precursors to special schools or *Heilanstalten*. This German term expresses the concept of a medical deficit which needs to be healed in an institution (Biewer, 2010).

These early developments in providing access to education for learners who diverged from the norm focused on medical criteria and categories. They were dominated by the medical profession and, consequently, medical and psychiatric perspectives. Initiatives to further open education stopped short in the darkest chapter of acceptance and care for people with special needs and/or disabilities; during World War Two, the rise of different approaches and measures led to increased segregation, institutionalisation and euthanasia in Europe.

The initiatives of disability rights activists and parents grew in the 20th century, specifically in the 1960s, 1970s and 1980s. They allowed the voices of learners vulnerable to exclusion to be heard (European Agency, 2022b) and fought for education to be considered as a human right for all.

This impacted on policy change, both in national legislation and at an international level, culminating in the Salamanca Statement of 1994. The Salamanca Statement pointed out that inclusive education can only happen 'if mainstream schools become capable of



educating all children in their local communities' (UNESCO, 2020a, p. 11). It stated that 'every child has a fundamental right to education, and must be given the opportunity to achieve and maintain an acceptable level of learning' (UNESCO, 1994, p. viii).

Lena Saleh, who was head of UNESCO's special educational needs section at the time, stated: 'The Salamanca Declaration certainly opened the door and gave an impetus for change. It had a world-wide impact' (Ainscow, Slee & Best, 2019, p. 673).

Despite these aspirations, nearly two decades later, Rose (2010) criticises:

The struggles of society to come to terms with diversity have often led to the imposition of negative labels and stereotypical interpretations of that which we cannot easily understand. It is far easier to judge others by measuring them against our own egocentric self-image than it is to accept that those whom we perceive as different from ourselves are of equal worth. ... All too often in the past our schools have been institutions lacking in the necessary tolerance to recognise, appreciate and address the needs of children who are considered 'different' and are said to challenge existing systems (pp. 1–2).

Compensatory approaches in education to increase individual learners' participation

In the 20th century, education for learners with special needs and/or disabilities who needed support from specialised staff was considered 'special education'. These learners were considered to have 'special educational needs' in comparison with 'typical learners' of a similar age. Special education was understood as a way to provide learners considered to have special educational needs with better access to education and supportive measures. This special education took place mostly in special schools or institutions outside the mainstream school system, away from friends or peers (European Agency, 2022b).

At the time, this was a progressive movement to include learners with special needs and/or disabilities, who were previously not considered in education at all, in the education system. Historically, it was an important step. However, it was still based on a deficiency model, where the deficit was considered to be within the learner and the aim was to fit or integrate the learner into an existing system with supporting provisions that compensated for the existing deficits.

A first shift towards widening access and opportunities came with the revision of the concept of special educational needs to special needs education. This moved the focus away from the learner's deficits towards the support and provision necessary for learners to succeed in schools (Rose, 2010). At the same time, the groups of learners considered to be vulnerable to exclusion in education (European Agency, 2022b) widened from learners with disabilities to include other learners failing in school for different reasons.

Those included and those not included in the group of learners benefiting from special needs education developed very differently in different countries. As such, there are still no internationally agreed definitions of 'special educational needs', 'special needs education' or 'learners with special needs' today. However, there is a commonality in how



needs were addressed through specialised teaching procedures, accessible settings, and adapted and assistive technology. Countries often face similar challenges in the context of learners' diverse needs.

However, like special educational needs, special needs education was still based on a categorical approach underpinned by a medical model. It considered the deficit to be within the learner and addressed it through compensatory measures (European Agency, 2022b; Murdoch, Bilgeri & Watkins, 2023; Hurst, 2003). These compensatory measures aimed to support learners by increasing individual levels of participation in education.

In 2008, the European Commission recognised an increase in diversity in school classes arising from 'gender, socio-economic groups, ability or disability, mother tongues and learning styles' (Commission of the European Communities, 2008, p. 6). However, more than 2% of learners across the European Union were still taught in segregated settings due to their special educational needs (ibid., p. 10). This demonstrates that, despite good intentions, special needs education has not achieved what modern education systems need. Aimed mostly at learners with special needs and/or disabilities, it does not address the increasing diversity and intersectionality of today's classrooms.

Holistic approach to transforming education systems

Today, the education system is at a point where it is necessary to reflect again on whether past achievements are sufficient in the context of a changed world. Should one be satisfied with what has been achieved or continue to advance? Is adaptation sufficient or is reform necessary to cater for learner diversity and the complexity within education systems?

Building more inclusive education systems requires more holistic or comprehensive thinking about the education system, with learners at the centre. This includes considering policies from a national to a local level, as well as multi-level and cross-sectoral organisation of learning support, collaboration across schools and services, and personalised learning.

In *Celebrating 25 years on the path to inclusive education*, the Agency acknowledges that:

Inclusive education challenges the concept of special needs education as 'different from' or 'additional to' the education provided for most learners. Despite this, it has often replicated rather than replaced the structures and processes of special needs education (European Agency, 2022c, p. 60).

The Agency activity [Legislative Definitions around Learners Vulnerable to Exclusion](#) concluded that inclusive education is often still interpreted as:

... a type of education specifically aimed at learners with disability and/or special needs, instead of an educational approach that caters for all learners, with all of their diverse and individual needs, by identifying and removing barriers to learning. These barriers include the potential legal barriers that fail to address discrimination and ensure all learners' full participation, as outlined in international legislation (European Agency, 2022b, p. 53).



In some cases, the appropriate legislation is in place, but everyday practice does not implement it successfully (European Agency, 2022b).

Hunt supports the need to increase the focus on fixing education systems instead of learners. She argues that inclusive education ‘requires the rethinking and reconceptualization of education and of ALL elements within it’ (2020, p. 6). This is only possible with a shift away from categorising learners based on medical models, to focusing on all learners vulnerable to exclusion from education (Ainscow, Booth & Dyson, 2006) and by building schools’ capacity to support existing learner diversity.

In line with a more holistic approach, the Agency has not defined the term ‘inclusive education’. Instead, it agreed a vision for inclusive education **systems** with all member countries in 2015, which was re-confirmed in 2022:

All learners of any age are provided with meaningful, high-quality educational opportunities in their local community, alongside their friends and peers (European Agency, 2022a, p. 1).

All Agency activities reflect the move towards a rights-based approach (European Agency, 2021; 2022b; 2022d; Opertti, Walker & Zhang, 2014). It is generally considered that the goals of inclusive education are most effectively met when policy and practice ‘prevent different forms of educational exclusion before they happen’ (European Agency, 2018, p. 18). When this cannot be achieved, it is necessary to ‘intervene to ensure that good quality inclusive education’ is always available to all learners or, as a last resort, ‘compensate with specific actions and provision when prevention and intervention are not enough’ to adequately meet learners’ needs in inclusive settings (ibid.).

Changes are visible in Europe. These include, for example, legislation which is beginning to reflect a rights-based approach to providing high-quality education, formerly segregated special settings becoming resource centres (educational centres and/or institutions which provide support and consultancy to promote inclusion), and the increased diversity of learners attending European schools.

Inclusive education systems aim to:

... ensure every learner’s right to inclusive and equitable educational opportunities. This aim is directed at **all learners**, while recognising the need to specifically address the particular needs of some **learners vulnerable to exclusion** from education (European Agency, 2022b, p. 14).

At the same time, ‘every learner has their own unique experiences of discrimination and/or barriers to learning’ (ibid.). Inclusive education systems must therefore recognise and consider ‘everything and anything that can marginalise learners and increase their chances of exclusion’ (ibid.).



Building on this, considering the needs of all learners vulnerable to exclusion requires increasing recognition of **intersectionality**. Intersectionality respects the interconnected nature of all social categorisations (Nadan & Korbin, 2018). These include:

... gender, remoteness, wealth, disability, ethnicity, language, migration, displacement, incarceration, sexual orientation, gender identity and expression, religion and other beliefs and attitudes (UNESCO, 2020b, p. 14).

UNESCO's Global Education Monitoring Report Summary emphasises that:

Contextual factors, such as politics, resources and culture, can make the inclusion challenge appear to vary across countries or groups. In reality, the challenge is the same, regardless of context. ... Inclusion cannot be achieved one group at a time ... Learners have multiple, intersecting identities. Moreover, no one characteristic is associated with any predetermined ability to learn (UNESCO, 2020c, p. 11).

Instead of categories a learner may or may not fall into, the focus shifts to the barriers some learners experience within the education system that may marginalise or exclude them.

A 'design for all' or holistic universal design mindset is where everything is designed to be 'usable by all' without the need for adaptation (UNESCO, 2020b, p. 420). This preventative approach is an aspirational standard for implementing educational settings that are built for all learners.

In *Ensuring the right to equitable and inclusive quality education*, UNESCO (2018) argues that there is a need for greater clarity around the principles underpinning a more holistic approach to quality education for all. In support of this holistic approach, *Reimagining our futures together* (UNESCO, 2021a) considers the future role of education systems and stresses the need for education to be a shared social commitment to human rights. To achieve this, all stakeholders' capacity to care and co-operate (across policy levels and sectors) must be strengthened.



THE JOURNEY TOWARDS DIGITAL TRANSFORMATION



This section focuses on the other strand of development, outlining the advances in the field of technology. It explores how technology has evolved in terms of performance and diffusion, and how it has increasingly come to influence the nature of learning and teaching today.

These developments in the technological field are outlined alongside comparable milestones, although they did not take place simultaneously with the educational developments, nor were they initiated or promoted by the same stakeholders.

Establishing access to technology

In the industrial but pre-digital age, technology use was largely confined to the world of work and played a subordinate role, if any, in other areas of life. After the two world wars, many individuals were war-disabled (Salvante, 2020; Gerber, 1994), returning home with paralysis due to damaged nerves or missing limbs. Efforts to re-integrate them into agriculture and industry made it necessary to adapt technologies to the needs of primarily physically disabled workers.

Around this time, the discipline of work design, or ergonomics, also emerged in response to the growing realisation that many work-related injuries and illnesses were due to the poor design of tools, equipment and work processes. Addressing these issues improved both worker health and productivity.

Initially, however, ergonomics focused mainly on design for the ‘average worker’. Extensive studies to measure a wide range of body dimensions (i.e. anthropometry) provided normally-distributed data. This allowed designers to develop workplaces and tools for the ‘standard’ and to refer to special designs for the 5% who deviated the most, both above and below the average measures – the so-called 5th and 95th percentile (Fisher, 1938). This led to the creation of special workplaces optimised for those workers who did not fit the norm, including workers with disabilities. Later, the portfolio expanded to include newer technologies that enabled people with sensory impairments to participate in certain work activities.

A large body of experience, a pool of technical adaptations and extensive recommendations for action were developed in workplace design to enable people with certain sensory or physical impairments to access selected areas of the world of work (Berning, Jochheim & Scholz, 1975; Lauruschkat & Schulte, 1980). However, this knowledge remained confined to the world of work, and only certain employment areas.

In the education field, technologies played a subordinate role for a long time. In the early 20th century, special ‘technologies’, such as sign language for deaf learners or large-print or Braille texts for visually impaired or blind learners (McBurney, 2012; Jiménez et al., 2009), were only available in specific, and therefore segregated (i.e. non-inclusive), educational institutions that focused on the target group.



Compensatory approaches in technology design to increase participation levels

As technology became more widespread in all areas of life, more specialised technology – known as assistive technology (World Health Organization, 2018) – was developed and used to mitigate or compensate for impairments (i.e. deviations in body structures and functions, including intellectual/cognitive disabilities). The main aim was to enable assistive technology users to perform as well as possible in ‘normal’ workplaces compared to workers without disabilities.

Similarly, using assistive technologies in educational contexts aimed to enable the (then still so-called) integration of learners with disabilities into mainstream educational institutions. However, most assistive technologies could not fulfil this promise as they were fundamentally unsuitable to achieve parity with non-disabled learners (Ravneberg, 2012; Carneiro, Rebelo, Filgueiras & Noriega, 2015). Reasons for this were their often inadequate design, poor usability, high purchase or maintenance costs, the stigma attached to aids that visibly discriminate against individuals, etc.

In the 1980s and 1990s, with the advent of personal computers and the internet, software became a common part of the work environment for a growing proportion of the workforce. It also entered the education sector. In particular, off-the-shelf software (such as office suites) spread rapidly. As a result, the accessibility requirements for these products increased. Software and hardware, aimed at the widest possible range of users, was expected – and later required by law – to be **accessible**.

However, accessibility at this time largely referred to making technology operable by people with different types of disabilities. Operable meant that the technology was usable, but not necessarily as fast, informative, convenient or enjoyable as it was for non-disabled users, and therefore not equitable. Again, this did not allow users with disabilities to interact with the software on an equal footing (Nielsen & Mack, 1994). These technical approaches were therefore unsuitable for removing technology-inherent barriers and, at best, only mitigated them.

Meanwhile, technical accessibility as a concept had further matured. Hardware and software could build on tools that addressed a wide range of physical, cognitive or sensory support needs.

Most desktop and mobile technologies, such as smartphones or tablet computers, began to implement accessibility tools at the operating system level from the early 1990s (e.g. Mac OS 7 in 1991, Windows 95 in 1995, Linux in the late 1990s, iOS in 2007, Android in 2008). This ensured that accessibility functionality was available throughout the system without adding compensatory third-party assistive technology. If each individual software application created its own accessibility solutions, there was a risk that each approach would be fundamentally different from that of another application. This would place an additional burden on the user. Instead, these applications could now tap into uniform accessibility functions that were available operating system-wide and could be used consistently.

It was at this time that the vision of **universal design**, originally named ‘design for all’ in the architecture field (Mace, 1985), was applied to software design. Nowadays, universal



design means ‘the design of products, environments, programmes and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design’ (United Nations, 2006, Article 2). It does ‘not exclude assistive devices for particular groups of persons with disabilities where this is needed’ (ibid.).

Universal design continues to be a leading vision in ICT design (Fisseler, 2020). However, despite all the advances, there are technical or economic limits on universal design that cannot yet be overcome. As such, compensatory technologies (i.e. assistive technologies) are still required.

Furthermore, even when technologies are implemented according to universal design principles, they may still provide different levels of interaction quality for different users. These differences in user experience may lead to or exacerbate discrimination. For example, using alternative interaction patterns to create inputs or capture content, such as using eye movements to position the pointer on a screen or audio output of screen content, requires different amounts of time. These differences can be decisive. For instance, in the educational context there are usually time limits in assessment situations. Learners using alternative interaction patterns may be at a disadvantage if their interaction with software is more time-consuming or more tiring than for other learners (Cunningham & Lamond, 2021; Murchland & Parkyn, 2010).

There are design rules and recommendations for ‘conventional’ computer configurations consisting of a computer, screen, keyboard and mouse. These rules and recommendations can help to achieve high-quality interaction, e.g. the International Organization for Standardization (ISO) 9241 ‘Ergonomics of human-system interaction’ series of standards. However, similar rules for alternative input or output options, such as those typically used by people with disabilities, are mostly lacking (with some exceptions, e.g. ISO/IEC 30071-1:2019 enabling organisations to embed accessibility considerations, or ISO/IEC 40500:2012 on web content accessibility).

Within the ergonomics and usability research communities, there is no established consensus about what constitutes good design. This means that each software developer must find suitable solutions, which is inefficient and does not contribute to the development of high-quality interaction.

To mitigate the shortcomings of insufficient design, participatory, user-centred design approaches should be more widely adopted. Involving end-users in ICT development and design processes, particularly for assistive technology, can improve usability as well as other quality aspects, such as utility or attractiveness (Arthanat, Bauer, Lenker, Nochajski & Wu, 2007; Bricout et al., 2022). It could also identify other accessibility aspects, such as economic, socio-economic, infrastructural or other barriers. However, current research shows that this approach is far from being applied as standard.

Furthermore, since the introduction of the International Classification of Functioning, Disability and Health (ICF) in 2001, the perception of disability has changed significantly worldwide. The so-called ‘medical model’ of disability, where disability is viewed as an individual medical problem or defect that needs medical intervention or rehabilitation to be cured or repaired, has largely been replaced. Today, there is growing recognition and acceptance of new models of disability. These models all generally share the view that disability is a social construct resulting from the interaction between individuals with



impairments and a society that is not designed to accommodate them (World Health Organization, 2001; Shakespeare, 2013; Oliver, 2013).

This perception, however, is not yet reflected in technology development. Design still focuses mostly on a 1:1 interaction of a person – who continues to be assigned to a disability category due to their health condition – with a piece of technology. Many approaches of both technology design and evaluation still ignore the fact that disability is the result of a complex interaction between a health condition and contextual factors. These factors are usually complex and can include different or overlapping life domains, varying activities, other people, and many other things.

For education in particular, the most important contextual factors relate to the environments and situations in which learning takes place. These include learning alone, bilaterally, in groups or from peers; at school, at home or on the go (anytime and anywhere); face-to-face, virtually or remotely, or in mixed settings; real time, synchronous or asynchronous; formal vs. informal learning, etc.



TRANSFORMING INCLUSIVE AND DIGITAL EDUCATION SYSTEMS



Although inclusive and digital education systems developed separately, the various advancements were mutually supportive. They must be seen as such and the connection between them further promoted.

This paper has tried to outline parallel developments subjectively and without claiming to be comprehensive. Now these lines of development are aligned. However, more work is needed to understand the precise requirements of the synergies between inclusive education and digital developments at different levels of the system, from individual to organisational and policy levels. This would ensure the best outcomes for learners in general and for learners vulnerable to exclusion specifically.

UNESCO (2021b) stresses that there are high expectations for technology to enable the achievement of Sustainable Development Goal (SDG) 4 to *Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all*:

The achievement of SDG 4 is dependent on opportunities and challenges posed by technology. The Incheon Declaration was explicit: 'Information and communication technologies (ICTs) must be harnessed to strengthen education systems, knowledge dissemination, information access, quality and effective learning, and more effective service provision' (ibid., p. 2).

The European Union (EU) Digital Education Action Plan (2018–2020) echoes this. The Communication from the Commission on the action plan stresses that:

If education is to be the backbone of growth and inclusion in the EU, a key task is preparing citizens to make the most of the opportunities and meet the challenges of a fast-moving, globalised and interconnected world.

Reform efforts continue every year, yet a persistent divide exists between and within EU Member States, in particular regarding digital infrastructure and skills, all of which hinders inclusive growth (European Commission, 2018, p. 2).

The Digital Education Action Plan (2021–2027) states the need to advance digital technology as a given, while recognising the role of different stakeholders in achieving successful digital transformation in education:

Digital technology, when deployed skilfully, equitably and effectively by educators, can fully support the agenda of high quality and inclusive education and training for all learners. It can facilitate more personalised, flexible and student-centred learning, at all phases and stages of education and training. ... However, the type and design of technological tools and platforms, as well as the digital pedagogy used, impact directly on whether individuals are included or excluded from learning. Students with disabilities, for example, need tools



that are fully accessible if they are to benefit from digital transformation (European Commission, 2020, p. 1).

The question today is not whether digital technologies have the potential to improve and strengthen inclusive education, but how to exploit this potential. For example:

- Is it enough to learn from past experiences to take this next step in development, or do we need entirely new approaches?
- Is the necessary range of methods – pedagogical, technical, social, political, etc. – already available to deal with the complexity of the issues?
- Can individual disciplines and working groups, which continue to focus on partial problems in the hope of making a relevant contribution, solve complex questions like these?
- Is it possible to anticipate and potentially influence the impact of rapid technological developments, such as artificial intelligence, on the education system in general and on inclusive education and its teachers and learners in particular?
- Is there sufficient understanding of the interrelationships and implications of changes in these complex systems for learner participation, inclusion and achievement?
- Is there a clear understanding of educational technologies' role in the discussion on intersectionality, and how they could amplify supposedly negligible barriers and thus contribute to discrimination and exclusion, even across life domains?
- Is there a way to shorten the time from the current technical and social trends, to trend analysis, technology assessment and policy development, to their eventual translation into school, teacher and learner practice?
- Finally, how should the potential of learners, who are possibly already experts in technology, be used in the face of rapidly developing technical trends?

Following his reflection in *Confronting Obstacles to Inclusion* that to achieve inclusion, socio-economic and policy structures need significant changes, Rose concludes:

A holistic approach to tackling issues of social injustice and to formulating new structures which ensure inclusive practices not only in schools but within communities will demand a broader focus from researchers and activists than has often been in evidence to date (2010, p. 5).

Over a decade later – with the world experiencing a pandemic, dramatic technical progress and social and political upheavals – this still holds true.



MOVING FORWARD



Transforming education in a digital world to enable inclusive learning experiences requires recognition of the synergies and dependencies between inclusive education and digital solutions and developments. Research, development, practice and political decision-making in both the education and ICT sectors must explore and act upon these synergies.

Issues for consideration include:

- Providing analyses, case studies or empirical research on the role of educational technologies in times of crisis, particularly to what extent they contribute to improving or degrading education system resilience
- Using systemic approaches that align digital and educational change processes at the individual and organisational level with those at the political level to move towards effective inclusive digital education (European Agency, 2022e)
- Using innovative approaches to account for widely differing technology generations in learners' life domains, especially education and leisure (i.e. rapid adoption of the latest technological developments in private life versus lengthy political and organisational consideration of proven educational technologies with a corresponding lead time before roll-out)
- Using approaches that, while maintaining the primacy of pedagogy, take into account key messages from other areas, such as technology development, at an early stage, evaluate them, assess their impact and, if necessary, ensure that education is considered in their (further) development and adaptation
- Systematically implementing participatory approaches to actively co-create education-relevant technologies and content, considering all relevant stakeholders
- Using evaluation methodologies that assess the impact and outcomes of technology use in education, with regard to participation, inclusion and achievement, at individual, organisational and education system levels
- Fostering innovative research approaches to identify and assess interrelated technology barriers that have a potentially discriminatory or disadvantageous overall effect on individuals or user groups
- Exploring opportunities to build and take advantage of bridges/interfaces between the increased use of technologies in formal education and the use of the same technologies in informal, lifelong learning
- Fostering opportunities for critical reflection on the consequences of the current very high pace of innovation in developing and applying (disruptive) new technologies and their impact on education, with a particular focus on inclusive education.

Inclusive education systems and the field of digital technology are increasingly overlapping. Developing policy and practice in one area without considering the other would be a lost opportunity. Transforming education in a digital world to enable quality



and inclusive learning experiences for all learners requires a joint consideration of both fields in practice and in policy-making.

This is only achievable with a holistic approach which engages all levels of policy-making, and all stakeholders in education practice and technology development – especially learners.



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