Digital Inclusion in Education

Short paper/literature review to support part of the ENTELIS White Paper on Digital Inclusion

Katerina Mavrou & Maria Meletiou-Mavrotheris, European University Cyprus

with contributions from Marcia J. Scherer and Evert-Jan Hoogerwerf

Introduction

This short paper is a literature review of the main aspects of technology in the education of children with disabilities, aiming to scientifically support the education part of the ENTELIS White Paper on Digital Inclusion. Hence the paper summarizes the transition from special to inclusive education, through the shift from the medical to the social and human rights models of disability, followed by the current trends in the use of ICT-AT in (inclusive) education and closing with some references on the role of technology in assessment strategies and trends in education, from various perspectives.

From Special to Inclusive Education

For many years the education of children with disabilities was associated with the provision of special education in segregative educational settings and specialized curricula (e.g. Lewis & Norwich 2005; Scherer, 2004). Rooted in the medical model of disability, special education represented the view that any 'problems' and 'deficits' were located within the child and thus these problems had to be remedied in order for the child to fit the 'norm' (Barnes, Mercer, & Shakespeare 1999), a view also associated with the charity model, which perceives disabled people as pathetic and passive individuals in need of charity rather than rights. In the 80s approaches for the education of children with disabilities started shifting from special schooling to the integration into mainstream schools, which however was (and sometimes still is) perceived as an opportunity for socialization rather than education (Symeonidou & Phtiaka 2009, 2014). Following the discussions on integration in research and educational policy the philosophy of inclusive education evolved in 90s with the milestone of Salamanca Declaration (UNESCO, 1994) which advocated that mainstream schools should be restructured at all levels in order to accommodate the needs of all children on equal terms. Inclusive education perceived diversity as part of human nature, and as such the school (and not the child) had to change dramatically in order to provide quality education for all children (Symeonidou & Mavrou, 2014). This ideology shifted far from the medical and charity models of disability towards the social model of disability, initially discussed by Finkelstein (1980). According to the social model society and not the disabled person had to change in order to include people with disabilities. Within this context, an inclusive education approach demands an inclusive curriculum and learning processes that will hold the philosophy of embedded accessibility and universal design for learning.

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Trends in technology in education for all

Rapid advances in information and communication technologies (ICTs) have provided the opportunity to create entirely new learning environments by significantly increasing the range and sophistication of possible instructional activities in both conventional and e-learning settings. A wide diversity of powerful and readily available technological tools, offer myriad opportunities for transforming pedagogy through the adoption of learner-centered instructional approaches. Multimedia tools offer novel and creative ways of teaching that can address a variety of learning styles (Junaidu, 2008; Kahn, 1997; Mandernach, 2009; Scherer 2005). Web 2.0 tools (e.g. video-sharing websites such as YouTube, blogs, wikis, podcasts, social networks such as Facebook and Twitter, virtual worlds, RSS feeds, social bookmarking, etc.) can inspire innovative teaching methods that stimulate collaboration among learners, creation and sharing of information, and development of online learning communities (Baxter, Connolly, Stansfield, Tsvetkova, & Stoimenova, 2011; Duffy, 2008; Meletiou-Mavrotheris & Mavrotheris, 2007; Roodt & Peier, 2013; Williams & Chinn, 2010). This advancement of technology brought forward a huge range of opportunities in the education of learners with disabilities aiming to reinforce the efforts for inclusive education. As research indicates that the pedagogical practice is still not totally ready for inclusion (Runswick-Cole & Goodley, 2011; Symeonidou & Phtiaka, 2014), the advancement in ICT and Assistive Technology based on ICT (ICT-AT) is anticipated to present an important contribution to differentiated learning and instruction and universal design for learning (CAST, 2015), establishing a creative learning environment and supporting teachers in an inclusive classroom (Istenic Starcic and Bagon, 2013). Recent studies indeed provide evidence of the positive impact of the utilisation of technology on the learning experience of children with disabilities, with examples such as the use of mobile devices for the enhancement of math skills (eg O'Malley et al, 2013), or robots for the development ofplay and participationskills (eg Adams et al, 2013).

Nevertheless, as a consequence of this rapidly changing technological advancements, digital competences become a vital part of the education of learners with disabilities as the digital divide seems to be a reality among a variety of settings and groups of people.

Technological trends in assessment in education

In order to advance quality and equity of instruction, education should provide fair and valid assessment for all learners, including people with disabilities. The rapid technological change and spread of information technology has greatly impacted educational assessment, creating both new prospects and new challenges with regards to the assessment of learners with disabilities.

Advances in technology have created unprecedented opportunities for assessment to adhere to the principles of Universal Design for Learning. Contemporary ICT-AT applications support a variety of flexible, learner-centered assessment strategies that are customized and adjusted for individual

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needs, thus addressing the diverse needs of all learners, and leading to improved fairness and validity of assessments (Bennett, 1999). Assistive technologies (e.g. Voiceover screen readers, magnifiers, etc.), often coming as built-in features in off-the-shelf products such as the iOS and Android-based phones and tablets or as downloadable applications, have made it easier and more affordable to accommodate disabled students' specific needs for presenting instructions and test items during an assessment (Hakkinen, 2015). They provide multiple pathways for disabled students' actions and expressions, and alternative means for them to communicate their questions or ideas and to express what they have learned (Model Cornerstone Assessment, 2015). Moreover, the multiple tools offered by contemporary technologies for continuous collection and analysis of rich data related to each individual student's learning progress, are a valuable resource for inclusive education, facilitating differentiation of instruction and individualized learning. Through employing such tools, educators can use formative indicators of student performance as a guide for developing data-driven solutions for instructional improvement that can, in turn, help each student maximize his/her learning.

While the employment of new technologies can facilitate a variety of effective techniques and strategies for the assessment of learners with disabilities, increased innovation in testing (e.g., adaptive assessment, simulations, etc.) can also present serious challenges. Technology-based assessment techniques utilized by school teachers and other educators often do not meet the principles of Universal Design, leading to intersectional forms of exclusion due to inaccessible design. The emerging trend towards standardization, coupled with the enactment of laws incorporating or referencing technical standards (Hakkinen, 2015) are key drivers towards combating this phenomenon and ensuring that the new computer-based delivery platforms and assistive technologies do not alter the construct(s) to be assessed or make the assessment process more complicated or even inaccessible for some learners (Thurlow & Larson, 2011). Standards from the domain of technology such as European Union's Standardization Mandate 376 (European Commission, 2013), define technical requirements for designing accessible features covering all disabilities and all aspects of software products, document files, and websites. The field of assessment has also developed its own standards to ensure accessibility and universal design of assessment instruments, so as to support the individual needs of a diverse intended population of test takers (Hakkinen, 2015). Examples of such assessment standards include the Standards for Educational and Psychological Testing (American Educational Research Association [AERA], American Psychological Association [APA], and National Council for Measurement [NCME], 2014), and the Educational Testing Service Standards for Quality and Fairness (Educational Testing Service [ETS], 2015). In addition to technical and assessment standards, the accessibility legislation currently being enacted in different EU countries and internationally, also helps to ensure that people with disabilities are being treated fairly through the development of accessibility features in computer-based and technology-enhanced assessments.

The current move towards more complex and interactive test items being delivered on a range of different platforms is likely to continue in upcoming years, posing further significant challenges to assessment developers as they attempt to address accessibility issues. Moreover, emerging

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technologies such as 3D-printed objects or augmented reality might offer further options for assessment, but their appropriateness needs to be verified through research evidence. Thus, an urgent need exists for high quality research on the optimal design of accessible assessments, and particularly on the integration of mainstream ICT-AT and accessibility in computer-based and technology-enhanced assessments. To harmonize the critical requirements of assessment and accessibility, and thus meet the needs of a broad range of disabled test takers in a fair, valid and reliable manner, the focus of this research should be on better understanding learners' needs and requirements and the ICT-AT they use both in and out of the classroom (Hakkinen, 2015).

Assessing which technologies and other supports, and their combination, will best benefit each individual student is a key aspect of educational services today. Tools to accomplish this exist, for example, *Assessing Students' Needs for Assistive Technology (ASNAT)* developed by the Wisconsin Assistive Technology Initiative (WATI) (WATI, 2017) and the *Matching Assistive Technology to Child-Augmentative Communication Evaluations Simplified Assessment Process (MATCH-ACES)* (Zapf, Scherer, Baxter & Rintala, 2016). As indicated in the paragraphs above, it is important for the school environment and infrastructure to support students in the development of ICT and ICT-AT skills. ENTELIS has developed a tool to guide schools and educators in understanding and inventorying how well they are doing in many key areas and where additional efforts should focus in order to increase student achievements and outcomes (ENTELIS, 2016).

In conclusion

The above discussed aspects of inclusive education (ie approaches to the education of learners with disabilities, technology (ICT-AT) and assessment of needs and competences) are highly interconnected. The route from special to inclusive education was not easy and literature shows that there is still way to go for reaching the vision of inclusion. The role of technology has proven to be very important in these efforts and this is widely acknowledged both in research and literature as well as by various stakeholders (see ENTELIS 2015, Literature review and ENTELIS 2016 State-of-art report). Current trends in technology in education are even more promising for the needs of learners with disabilities of all ages, especially taking into consideration the embedded accessibility features of contemporary mainstream technology. Nevertheless, the development of digital competences is one of the most vital factors to the effective use of ICT-AT. To this end assessment strategies in learners' evaluation of needs, existing competences, learning processes and learning environment hold a significant role.

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References

Adams, K., Rincón, A.M.R., EncarnaçÃo, P., Piedade, G. Helmbold, B., & Tuck, C. (2013). Learning Switch Scanning Skills by Playing with Robots. Paper presented at the AAATE2013 Conference. Vilamoura, Protugal, September 19-22, 2013

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (2014). *Standards for educational and psychological testing*. Washington, DC: American Educational Research Association.

Barnes, C., G. Mercer, and T. Shakespeare. 1999. Exploring Disability. A Sociological Introduction. Cambridge: Polity.

Baxter, G. J., Connolly, T. M., Stansfield, M. H., Tsvetkova, N., & Stoimenova, B. (2011). Introducing Web 2.0 in education: A structured approach adopting a Web 2.0 implementation framework. *Proceedings of the 7th International Conference on Next Generation Web Services Practices* (pp. 499-504). IEEE.

Bennett, R. E. (1999). Computer-based testing for examinees with disabilities: On the road to generalized accommodation. In S. Messick (Ed.), *Assessment in higher education: Issues of access, quality, student development, and public policy* (pp. 181–191). Mahwah, NJ: Lawrence Erlbaum Associates.

Center for Applied Special Technology (CAST) (2015). About Universal Design for Learning. Available at: http://www.cast.org/our-work/about-udl.html

Duffy, P. (2008). Engaging the YouTube google-eyed generation: Strategies for using Web 2.0 in teaching and learning. *Electronic Journal of e-Learning*, *6*(2), 119-130.

Educational Testing Service. (2015). *ETS standards for quality and fairness.* Princeton, NJ: Author. Retrieved from: http://www.ets.org/s/about/pdf/standards.pdf.

ENTELIS (2015). A systematic literature review on education and learning related to ICT and ICT-based assistive technology. Available at: http://www.entelis.net/en/node/198

ENTELIS (2016). Digital skills development and ICT in inclusive education A self-assessment framework for schools. Available at: http://www.entelis.net/sites/all/files/entelis_self_assessment_framework_for_schools_version_1.0_-_2016.pdf

ENTELIS (2016). State of the Art Report. Available at: http://www.entelis.net/en/node/237

European Commission. (2013). *European accessibility requirements for public procurement of products and services in the ICT domain* (European Commission Standardization Mandate M 376). Retrieved from

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This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

http://www.cencenelec.eu/standards/Sectors/Accessibility/PublicProcurement/Pages/M376.aspx

Finkelstein, V. (1980) *Attitudes and Disabled People: issues for discussion* .New York: World Rehabilitation Fund.

Hakkinen, M. (2015). Assistive Technologies for Computer-Based Assessments, *R&D Connections, 24*. Retrieved from: https://www.ets.org/Media/Research/pdf/RD_Connections_24.pdf

Istenic Starcic A., & Bagon, S. (2013). ICT-supported learning for inclusion of people with special needs: Review of seven educational technology journals, 1970-2011. *British Journal of Educational Technology*, *45*(2), 202-230.

Junaidu, S. (2008). Effectiveness of multimedia in learning and teaching data structures online. *Turkish Journal of Distance Education 9*(4), 97-107.

Lewis, A., and B. Norwich. 2005. Special Teaching for Special Children? Pedagogies for Inclusion. Berkshire: Open University Press.

Mandernach, B. J. (2009). Effect of instructor-personalized multimedia in the online classroom. *International Review of Researching Open and Distance Learning*, *1*0(3), 1-19.

Meletiou-Mavrotheris, M., and Mavotheris, E. (2007). Online Communities of Practice Enhancing Statistics Instruction: The European Project Earlystatistics. *Electronic Journal of e-Learning, 5* (2), 113-122.

National Coalition for Core Arts Standards (2014). *National core arts standards: A conceptual framework for arts learning.* Retrieved from: http://www.nationalartsstandards.org/sites/default/files/NCCAS%20%20Conceptual%20Framework_4.pdf

O'Malley, P., Jenkins, S., Wesley, B., Donehower, C., Rabuck, D. & Lewis, M. (2013). Effectiveness of Using iPads to Build Math Fluency. Presented at Council for Exceptional Children Annual Meeting 2013

Roodt, S., & Peier, D. (2013). Using Youtube© in the Classroom for the Net Generation of Students. *Issues in Informing Science and Information Technology, 10,* 473-488.

Runswick-Cole, K., & Goodley, D. (2011). The 'big society': A dismodernist critique. Disability & Society, 26, 881–885.

Scherer, M.J. (2004). Connecting to Learn: Educational and Assistive Technology for People with Disabilities. Washington, DC: American Psychological Association (APA) Books.

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This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Symeonidou, S., & Mavrou, K. (2014). Deconstructing the Greek-Cypriot new national curriculum: to what extent are disabled children considered in the 'humane and democratic school' of Cyprus? Disability and Society, 29(2), 303–316.

Symeonidou, S., and H. Phtiaka. 2009. "Using teachers' Prior Knowledge, Attitudes and Beliefs to Develop in-Service Teacher Education Courses for Inclusion." Teaching and Teacher Education 25 (4): 543–550.

Symeonidou, S., and H. Phtiaka. 2014. "My Colleagues Wear Blinkers … If They Were Trained, They Would Understand Better. Reflections on Teacher Education on Inclusion in Cyprus." Journal of Research in Special Educational Needs. 14(2), 110-119

Thurlow, M. L., & Larson, J. (2011). *Accommodations for state reading assessments: Policies across the nation.* Minneapolis, MN: University of Minnesota, Partnership for Accessible Reading Assessment.

United Nations Educational Scientific and Cultural Organization. 1994. The Salamanca Statement and Framework for Action on Special Needs Education. Paris: UNESCO.

Williams, J., & Chinn, S. J. (2010). Using Web 2.0 to support the active learning experience. *Journal of Information Systems Education, 20*(2), 165-175.

Wisconsin Assistive Technology Initiative (WATI) Assessing Students' Needs for Assistive Technology (ASNAT). Available at: http://www.wati.org/?pageLoad=content/supports/free/index.php

Zapf, SA, Scherer, MJ**,** Baxter, MF & Rintala, DH. (2016) Validating a measure to assess factors that affect assistive technology use by students with disabilities in elementary and secondary education, *Disability and Rehabilitation: Assistive Technology*, 11(1), 38-49. PMID: 26696460.

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