Department for Education

Assistive Technology

Stakeholder report: Educators

August 2020

Dave L. Edyburn, Ph.D.

University of Wisconsin-Milwaukee

GSR
GOVERNMENT SOCIAL RESEARCH
Social Science in Government

Contents

Executive Summary

Assistive technologies (AT) are specialised products designed for people with special educational needs and disabilities. This stakeholder report describes the findings of the rapid literature review relevant for educators.

Additional stakeholder reports for administrators, developers, policymakers, and researchers can be found at http://www.knowledge-by-design.com/ukat/

This report was produced as part of a project funded by the Department for Education, England (DFERPPU/2019/038). The views expressed herein do not necessarily represent the positions or policies of the Department for Education. No official endorsement by the Department for Education of any product, commodity, service, or enterprise mentioned in this report is intended or should be inferred.

Introduction

1 The Department for Education's Education Technology Strategy, Realising the Potential for Technology in Education, described 10 EdTech Challenges designed to catalyse activity in specific areas of the EdTech sector in ways that are aligned to the needs of teachers and students. One of these challenges focuses on needing to identify the best technology that helps level the playing field for learners with Special Educational Needs and Difficulties (SEND).

Learn More

Department for Education. (2019). Realising the Potential for Technology in Education. https://www.gov.uk/government/publications/realising-the-potential-of-technology-in-education

2 In order to meet this challenge it is necessary to understand the current landscape of assistive technology (AT) used in education and what impact they have on outcomes for students with special educational needs and disabilities (SEND). To this end, a rapid review of the literature on assistive technology (AT) in education was conducted over a ten-week period in February – April 2020. A final report from the project describing the findings is available for download.

Learn More

Rapid Literature Review on Assistive Technology in Education
http://www.knowledge-by-design.com/ukat/

3 The purpose of this stakeholder report is to provide administrators with insights about the use of AT in educational settings in order to facilitate the effective delivery of AT devices and services for pupils and learners with special educational needs and disabilities. Interested readers are encouraged to visit the project web site to query the interactive data set or contact the Principal Investigator with questions or requests for custom searches of the knowledge base.

Learn More

Contact Principal Investigator
Dave Edyburn <edyburn@uwm.edu>

What is Assistive Technology (AT)?

4 The World Health Organization describes AT as follows:

- Assistive technology is an umbrella term covering the systems and services related to the delivery of assistive products and services.
- Assistive products maintain or improve an individual's functioning and independence, thereby promoting their well-being.
- Assistive technology enables people to live healthy, productive, independent, and dignified lives, and to participate in education, the labour market and civic life. Assistive technology reduces the need for formal health and support services, long-term care and the work of caregivers. Without assistive technology, people are often excluded, isolated, and locked into poverty, thereby increasing the impact of disease and disability on a person, their family, and society.

Learn More

World Health Organization. (2018, May 18). Assistive technology.
https://www.who.int/news-room/fact-sheets/detail/assistive-technology

5 Over a lifetime, each of us will experience situations in which we personally, or, someone we know, will encounter limitations due to aging, disease, accident, or disability, that will impact the ability to perform basic life functions such as hearing, seeing, self-care, mobility, working, and participating in education. Whereas some of us may be born with a disability or disease that will require us to overcome limitations throughout our life, others will need to learn how to respond to challenges that arise from an accident or limitations that arise from simply growing older. As a result, AT has the potential to impact everyone, either directly as a personal user of AT, or indirectly, as a means of helping someone we know.

6 Realising the potential of technology in education involves maximising the application of assistive technologies to enhance academic, behavioral, social, and economic benefits

of pupils and students with special educational needs and difficulties. Historically, pupils and students with special educational needs and disabilities have had difficulty accessing the general education curriculum. This means they have been unable to achieve the same benefits from instruction as their peers.

Special Educational Needs

7 Disabilities manifest themselves in many different forms and severities. As of January 2019, 1.3 million (14.9%) of all pupils in England have special education needs.

Learn More

Special Educational Needs in England: January 2019
https://www.gov.uk/government/statistics/special-educational-needs-in-england-january-2019

8 Whereas the impact of a disability should always be considered on an individual basis, there are general domains of functioning that are affected by a disability (see Table below). Developers interested in a specific disability category are encouraged to focus on a particular row to understand the relevant applications of AT. Developers interested in a specific domain of functioning relative to AT are encourage to explore the table columns to understand the various groups that may benefit.

Table 1 Relevant Domains of Potential AT Application by Disability

	Domains					
Disability	access	behavior/social	communication	independence	learning	mobility
autism spectrum disorder	•	•	•	•	•	
deafness	•		•	•	•	•
deaf-blindness	•		•	•	•	•
emotional and behavioral disorders		•			•	
hearing impairment	•			•	•	
intellectual disability	•	•	•	•	•	•
orthopedic impairments	•			•	•	•
specific learning disability	•			•	•	
speech language or communication	•	•	•	•	•	•
traumatic brain injury	•		•	•	•	•
visual impairment	•		•	•	•	•

What Types of AT Help Which Kinds of Disabilities?

9 What is Known about AT Use by Pupils and Students with Autism?

Autism Spectrum Disorder (ASD) is a developmental disability that affects an individual's ability to communicate and engage in social interaction. For reasons unknown, the incidence of autism is increasing and is estimated to affect 1 in 54 children. 31% of children with autism also have an intellectual disability (i.e., IQ < 70). Access, behavior/social, communication, independence, and learning, are relevant domains for assistive technology applications. Relevant types of AT for this population include picture-supported text, visual schedules, social skills training, video modeling and prompting, communication boards, and augmentative and alternative communication (AAC).

Learn More

Caporale, B.A. (2013). AAC and autism report: Implementing evidence-based strategies in the classroom. *Closing the Gap, 32*(1), 5-11.

Jacobs, L. (2011). Lights, camera, interaction: Focus on video modeling techniques for inexpensive, fast and customized solutions for improving social skills. *Closing the Gap, 29*(6), 23-25.

Stokes, S.L., & Walser, P. (2012). Navigating the world of technology to meet the learning and behavioral needs of students with autism spectrum disorder. *Closing the Gap, 31(*1), 17-23.

10 What is Known about AT Use by Pupils and Students Who are Blind and Deaf?

The comorbid impact of blindness and deafness makes this one of the most isolating and challenging disabilities. Deaf-blindness is a low incidence disability impacting less than 1% of the population. Access, communication, learning, mobility, and independence are critical domains for assistive technology applications. Relevant types of AT for this population include braille, sign language, tactile graphics, wayfinding, mobile technologies, accessible computer workstations, and alternative access devices.

Learn More

Hernandez, M. (2017). Confessions of a general ed teacher: What my deaf and hard of hearing students taught me about good teaching. *Closing the Gap, 36*(4), 26-29.

McKenzie, A. R. (2009). Unique considerations for assessing the learning media of students who are deaf-blind. *Journal of Visual Impairment & Blindness, 103*(4), 241-245.

Perfect, E., Jaiswal, A., & Davies, T. C. (2019). Systematic review: Investigating the effectiveness of assistive technology to enable internet access for individuals with deafblindness. *Assistive Technology, 3*1(5), 276-285.

11 What is Known about AT Use by Pupils and Students with Hearing Impairments?

Hearing loss is a sensory disability that impacts an individual's ability to process oral information. Hearing impairments are classified as slight, mild, moderate, severe, or profound and generally affect everyone as a function of aging. Access, independence, and learning, are relevant domains for assistive technology applications. Relevant types of AT for this population include assistive listening devices, personal amplification systems, hearing aids, speech to text, signaling devices, and sign language. Cochlear implants are also a potential medical technology intervention but was considered out of scope for this review.

Learn More

Kbar, G., Bhatia, A., Abidi, M. H., & Alsharawy, I. (2017). Assistive technologies for hearing, and speaking impaired people: A survey. *Disability and Rehabilitation: Assistive Technology, 12*(1), 3-20.

Stover, D. L., & Pendegraft, N. (2005). Revisiting computer-aided notetaking: Technological assistive devices for hearing-impaired students. The Clearing House: A *Journal of Educational Strategies, Issues and Ideas, 79*(2), 94-97.

Vesel, J. (2015). Signing math and science. *Closing the Gap, 34*(4), 32-36.

12 What is Known about AT Use by Pupils and Students with Emotional/Behavioral Disturbance?

Pupils and students with emotional/behavioral challenges may exhibit aggression towards others, refuse to co-operate, distractibility and impulsiveness, impaired social interactions, and other mental heath issues such as anxiety, low self-esteem, negative self-concept, or withdrawal. Behavior/social and learning are relevant domains for assistive technology applications for this population. Relevant types of AT for this population include video modeling and prompting, social skills training, self-monitoring data systems, and augmentative and virtual reality.

Learn More

Cumming, T. M. (2013). Mobile learning as a tool for students with emotional and behavioral disorders: Combining evidence-based practice with new technology. *Beyond Behavior, 23*(1), 23-29.

Hirsch, S. E., Alves, K. D., & Dunn, M. (2019). Integrating technology for students with emotional and behavioral disorders to promote engagement. I*ntervention in School and Clinic, 55*(2), 94-102.

Murry, F. (2018). Using assistive technology to generate social skills use for students with emotional behavior disorders. *Rural Special Education Quarterly, 37*(4), 235-244.

13 What is Known about AT Use by Pupils and Students with Intellectual Disabilities?

Intellectual disabilities (ID), historically referred to as mental retardation, are a developmental disability that can affect an individual's intelligence and adaptive behavior and may be classified as mild, moderate, severe, or profound. Intellectual disabilities may be concurrent with other impairments that impact communication or mobility. Access, behavior/social, communication, independence, learning, and mobility are all relevant domains for assistive technology applications. Relevant types of AT for this population include picture-supported text, visual schedules, social skills training, video modeling and prompting, communication boards, and augmentative and alternative communication (AAC), audio books, alternative access, wearable AT, wayfinding, and more.

Learn More

Hanser, G., Musselwhite, C., & Wagner, D.K. (2019a). Comprehensive emergent literacy instruction for students with significant disabilities, including cortical vision impairment and complex communication needs. *Closing the Gap, 38*(4), 3-11.

Schaefer, J. M., & Andzik, N. R. (2016). Switch on the learning: Teaching students with significant disabilities to use switches. *Teaching Exceptional Children, 48*(4), 204-212.

Shanker, J., & Smolen, R. (2014). Using assistive technology to support literacy among individuals with moderate to profound disabilities. *Closing the Gap, 32*(6), 7-11.

14 What is Known about AT Use by Pupils and Students with Physical Disabilities?

Physical disabilities, also known as orthopedic impairments, are those that affect an individual's motor abilities. Examples include cerebral palsy, spinal cord injury, multiple sclerosis, spina bifida, or amputation. These conditions can exist in isolation or comorbid with other disabilities. Access, independence, learning, and mobility are relevant domains for assistive technology applications. Relevant types of AT for this population include alternative methods for accessing the computer keyboard and mouse such as switches and eye-gaze, speech to text, wheelchairs, wearable AT, and writing aids.

Learn More

Coleman, M. B. (2011). Successful implementation of assistive technology to promote access to curriculum and instruction for students with physical disabilities. *Physical Disabilities: Education and Related Services, 30*(2), 2-22.

Kangas, K., & Rotelli, L. (2014). Supporting the transparency of switch access to assistive technology (especially for students with the most complex bodies). *Closing the Gap, 33*(4), 4-7.

Larson, M. (2008). An introduction to switches, switch-activated software and how it all works. *Closing the Gap, 27*(4), 13-15.

15 What is Known about AT Use by Pupils and Students with Specific Learning Disabilities?

Specific learning disabilities (SLD) are high incidence disabilities that can affect an individual's ability to read, write, and/or calculate. In the UK, it is estimated that 1.5 million people have a learning disability. However, one problem associated with obtaining special educational services and AT for this population is that SLD are considered hidden disabilities. That is, they are not readily discernable. Access, independence, and learning are relevant domains for assistive technology applications. Relevant types of AT for this population include audio books, text to speech, speech to text, talking calculators, text simplification, spelling and grammar checkers, graphic organizers, writing aids, and more.

Learn More

Bone, E. K., & Bouck, E. C. (2017). Accessible text-to-speech options for students who struggle with reading. *Preventing School Failure: Alternative Education for Children and Youth, 61*(1), 48-55.

Dawson, K., Antonenko, P., Lane, H., & Zhu, J. (2019). Assistive technologies to support students with dyslexia. *Teaching Exceptional Children, 51*(3), 226-239.

Perelmutter, B., McGregor, K. K., & Gordon, K. R. (2017). Assistive technology interventions for adolescents and adults with learning disabilities: An evidence-based systematic review and meta-analysis. *Computers & Education, 114*, 139-163.

16 What is Known about AT Use by Pupils and Students with Speech, Language, and Communication Needs?

The area of speech, language, and communication needs is the most studied area of assistive technology. These types of impairments may affect one or more aspects of communication, such as production of speech sounds, stammering, voice problems, making sense of language, problems using language, or difficulty interacting with others. The prevalence of these issues is considered a high incidence disability. Access, behavioral/social, communication, independence, and learning, are relevant domains for assistive technology applications. Relevant types of AT for this population include picture-supported text, communication boards, augmentative and alternative communication (AAC), instructional software/apps, mobile technologies, and wearable AT.

Learn More

Caufield, F., & Carrillo, D. (2010). 200 a day the easy way: Putting it in practice. *Closing the Gap, 29*(2), 7-10.

Ekis, S. (2015). Beyond requesting: Five strategies for moving students who use AAC to the next level of communication. *Closing the Gap, 34*(5), 17-20.

Skau, L., & Cascella, P. W. (2006). Using assistive technology to foster speech and language skills at home and in preschool. *Teaching Exceptional Children, 38*(6), 12-17.

17 What is Known about AT Use by Pupils and Students with Traumatic Brain Injury?

A traumatic brain injury (TMI) could be congenital or acquired. Depending on the area of the brain affected it may impact an individual's communication, mobility, and/or cognition. Access, communication, independence, learning and mobility are relevant domains for assistive technology applications. Relevant types of AT for this population include alternative methods for accessing the computer keyboard and mouse, memory aids, speech to text, audio books, computational tools, and writing aids.

Learn More

Brunner, M., Hemsley, B., Togher, L., & Palmer, S. (2017). Technology and its role in rehabilitation for people with cognitive-communication disability following a traumatic brain injury (TBI). *Brain Injury, 31*(8), 1028-1043.

Leopold, A., Lourie, A., Petras, H., & Elias, E. (2015). The use of assistive technology for cognition to support the performance of daily activities for individuals with cognitive disabilities due to traumatic brain injury: The current state of the research. *NeuroRehabilitation, 37*(3), 359-378.

Martinez, A. P., Scherer, M. J., & Tozser, T. (2018). Traumatic brain injury (TBI) in school-based populations: Common sequelae and assistive technology interventions. *Advances in Neurodevelopmental Disorders, 2*(3), 310-321.

18 What is Known about AT Use by Pupils and Students with Visual Impairments?

Visual impairments are a sensory disability that affects an individual's ability to perceive information and may be classified as mild, moderate, severe, or blind. Whereas everyone loses visual acuity as they age, most mild visual impairments are remedied through the prescription of eyeglasses. Access, communication, independence, learning and mobility, are relevant domains for assistive technology applications. Relevant types of AT for this population include magnification, screen readers, text to speech, tactile graphics, wayfinding, mobile technologies, accessible computer workstations, and alternative access devices.

Learn More

Cochran, C.D. (2019). Providing content access while teaching braille literacy. *Closing the Gap, 38*(5), 35-37.

Perez, L. (2013). nABLEing all learners: Apps as transformational technology. *Closing the Gap, 32*(3), 4-7.

Scriven, L. (2019). Wearable electronic magnifiers: Pros and cons. *Closing the Gap, 38*(5), 53-56.

19 How Does the Availability, or Lack Thereof, of Accessible Educational Materials (AEM) Influence the Use of AT and Impact Academic Outcomes?

The ability to access and use AT is essential, but not sufficient, for closing the achievement gap experienced by pupils and students with special educational needs and disabilities. This insight has prompted considerable attention to the nature of inaccessible curricula. Historically, the problem was a textbook with its rigid fixed format. The evolution of digital learning materials, as well as the wealth of information available – or inaccessible – via the World Wide Web, has helped educators appreciate the value and flexibility of digital text (e.g., change the font, size, copy, paste, summarise, convert from text to speech) for diverse learners. Advocacy for AEM is a necessary component of AT devices and service systems. The importance of accessible educational materials cannot be underestimated during the COVID-19 pandemic and the shift to online instruction where pupils and students with special needs and disabilities may experience (1) barriers in online learning management systems, (2) multimedia and web pages that are not accessible, and/or documents that are not accessible, and (3) not having appropriate AT to support guided and independent engagement in learning activities.

Learn More

Advisory Commission on Accessible Instructional Materials in Postsecondary Education for Students with Disabilities. (2011). *Report of the advisory commission on accessible instructional materials in postsecondary education for students with disabilities.* Washington, DC: U.S. Department of Education.

Carl, D. F., Zabala, J., & Karger, J. (2015a). Accessible educational materials in the IEP (Part 1). *Closing the Gap, 34*(3), 13-16.

Carl, D. F., Zabala, J., & Karger, J. (2015b). Accessible educational materials in the IEP (Part 2). *Closing the Gap, 34*(4), 9-13.

Fox, C., & Jones, R. (2018). N*avigating the digital shift 2019: Equitable opportunities for all learners*. Glen Burnie, MD: State Educational Technology Directors Association.

McLaren, R. (2018). Accessible virtual learning environments: Making the most of the new regulations. Retrieved from https://www.policyconnect.org.uk/ research/accessible-virtual-learning-environments-making-most-new-regulations

Department for Education

Reference: DFERPPU/2019/038

The views expressed in this report are the authors' and do not necessarily reflect those of the Department for Education.

For any enquiries regarding this publication, contact us at:
mailto:robert.rodney@education.gov.uk or www.education.gov.uk/contactus

This document is available for download at www.gov.uk/government/publications