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USE OF ASSISTIVE TECHNOLOGIES FOR LANGUAGE LEARNERS WITH VISUAL AND HEARING IMPAIRMENTS IN THE USA

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This article strives to provide research findings and implications for the use of assistive technologies (AT) for students with visual and hearing impairments. First, the common challenges associated with visual and hearing impairments in students while learning languages, and the process of fitting AT to this category of students have been discussed. The research was focused on AT for language learning, reading, writing. Assistive technology items have been grouped according to whether they enhances the visual or hearing capabilities of students with disabilities. Assistive technologies for students with visual impairments and blindness have been united in assistive technologies for reading (technologies that enhance sight capabilities, technologies that engage senses and abilities other than sight literature), assistive technologies for writing (technologies that enhance sight capabilities, technologies that engage senses and abilities other than sight); assistive technologies for students with hearing impairments (amplification devices, telecommunication device for the deaf, frequency-modulated amplification systems.

Based on principles of organization of language education in the system of language policy in the USA, the importance of English learning for students with visual and hearing disabilities in the USA has been grounded. Areas for future research of assistive technologies for students with visual and hearing impairments and the value of research findings to optimizing the education and development of students have been shown as a great need for continued work in these areas.

Key words: *Assistive technologies, visual and hearing impairments, frequency-modulated amplification systems students with disabilities, visual aids, language education.*

Statement of the problem in general aspect. In modern conditions, the terms "inclusion" and "inclusive education" are of the particular importance, being one of the priority areas of the public education policy. Inclusive education suggests creature of the necessary adapted educational environment and the provision of supporting services, and not just granting the right to attend

educational institutions. The modern educational system is characterized by new approaches to education and training of various categories of people, including people with disabilities. The system of language policy in the USA guarantees persons with disabilities successful language learning and provides them with a range of assistive devices that increased their educational, vocational, and frivolous activities. Current descriptive study attempted to explore the effects of assistive devices on the language learning of hearing and visual impaired students. At present, unfortunately (in Ukraine in common practice), assistive technologies are not available in language teaching students with visual and hearing disabilities

The analysis of recent research and publications. An analysis of the literature on the problem showed that language training for students with hearing and visual disabilities will be more effective in creating special conditions at the university, including the availability of material, technical resources and assistive technologies. Material and technical resources can include the architectural environment of the institution, the organization of the workspace. Assistive technology is a prerequisite for the successful training of people with disabilities. Assistive technologies include devices, software and other means, the use of which allows expanding the capabilities of people with special educational needs in the process of receiving information, adapting them to living conditions and social integration.

The use of assistive technology (AT) for students with visual impairments (VI) and blindness has the potential to improve many student outcomes related to academics and learning (Bergwerk, 2011; Bouck, Shurr, Tom, Jasper, Bassette, Miller, & Flanagan, 2011; Bowers, Meek, & Stewart, 2001; Ferrell, 2006; Lovie-Kitchin, Bevanm, & Hein, 2001). The use of assistive technology for students with hearing impairments (HI) and deafness has been studied by C. Atlick (1998); H. Bano (2003); M. Cook, & M. Hussey (2000); C. de Castell (1986); M. Farooq (2015); A. Friend (2011), A. Graff (1978); A. Hameed (2003); T. Hasselbring, & C. Glaser (2000).

The aim of our research is to systematize the US experience in the use of assistive technologies in teaching students with disabilities, i.e. access to language education, legal protection, and regulatory support of students with visual and hearing disabilities in the USA.

Main material presentation. Students with impaired hearing or vision suffer a great deal of disadvantages due to the presence of hearing or visual impairment. The products or equipments used to develop and enhance the functional competencies of disable people are known as *assistive technologies*. Assistive technology (AT) provides aid of adaptive technology to individuals with disabilities (UNESCO, 2006). Assistive technologies help individuals to

spend their lives independently (Hameed, & Bano, 2009). "Technology has opened many educational doors to the youth, particularly to children with disabilities. Alternative solutions based on technology are accommodating physical, sensory, and cognitive impairments in many ways" (University of Washington: Disabilities, Opportunities, Internetworking, and Technology). Selected and useful solution have been adapted to the individual's needs of disabilities. User centered approaches have been taking flexibility to help out the persons with disabilities (Penaud, Mokhtari, & Abdulrazak, 2004). Assistive technology can be a lifelong partner and supporter for the person who use it, to make the things possible at any level of intellectuality (Bouck, Shurr, Tom, Jasper, Bassette, Miller, & Flanagan, 2012). Lee, Templeton (2008) stated that "Empirical studies consistently show that the use of assistive technology promotes self-confidence, freedom, independence, and meaningful participation in home, school and community" (Bouck, Shurr, Tom, Jasper, Bassette, Miller, & Flanagan, 2012; Center for Assistive Technology and Environmental Access, 2009; Hameed, & Bano, 2003; Lee, & Templeton, 2008; University of Washington: Disabilities, Opportunities, Internetworking, and Technology).

The term "assistive technology" is closely related to the term "technology providing opportunities", i.e. technology that provides access to information, communication or the environment. Assistive technology called upon to satisfy a wide range of needs – from physical disabilities, such as inability to work effectively with the mouse or keyboard, up to touch problems when with loss of vision and hearing the screen or sound devices become less useful.

Vision impairments and blindness, hearing impairments and deafness have the potential to disrupt students' academic learning in traditional, mainstream educational settings. The goals of implementing AT with students with VI and HI are to increase or improve their functional capabilities, support their education and development, and facilitate their independence. Professionals in the field of AT and HI assert these goals can best be achieved by engagement in a standard sequence of procedures for fitting AT to students (Bryant, 2003; Cook, & Hussey, 2000).

The process should begin with assessments of the student's skills and abilities, functional limitations, and learning needs, as well as task analyses of activities for which they will receive support. The resulting information should then be used to select AT devices that draw on the student's existing skills and abilities, improve their functional capabilities, and enable their full participation in target activities. When implementing the selected AT, professionals should consult the research literature to identify AT that has the greatest likelihood of effectiveness, take care to obtain the buy-in of the students regarding the AT, confirm use of the AT is convenient and effective, and provide training to the

student and others who may support his use of the AT. Finally, periodic and/or on-going evaluations should be carried out regarding the success of implementation of the AT, the device's state of repair, and the goodness of fit among the student's learning needs, skills, functional limitations, and activities for which she needs support (Center for Assistive Technology and Environmental Access, 2009; Cook, & Hussey, 2000; Independence Science, 2013b).

According to S. Diamant, C. Kirchner, N. Mervis this is particularly problematic for estimating prevalence because between one-third of children with some residual vision and two-thirds of children with blindness have one or more additional disabilities (Kirchner, & Diamant 1999; Mervis 2000).

According to the definition of UNESCO, assistive technologies are devices (equipment, software, etc.), provision or services aimed at strengthening, supporting or improving the functionality of people with disabilities.

Challenges Associated with Visual Impairments and Blindness. Visual impairments and blindness pose a number of developmental challenges to affected children. The conditions can detrimentally influence physical, cognitive, linguistic, social, and academic development, as well as contribute to the development of problem behaviors (Baillargeon 1993; Bergwerk 2011; Brodsky 2010; Fazzi et al. 1999; Houwen et al. 2010; Hyvarinen 2000; Perez-Pereira and Conti-Ramsden 1999).

Challenges to linguistic development. Impairments of vision can disrupt and delay the development of preverbal, verbal, and nonverbal language (Brodsky, 2010; Perez-Pereira, Conti-Ramsden, 1999). However, students with visual disability who have average intelligence or greater often attain typical levels of verbal language proficiency (Perez-Pereira, & Conti-Ramsden, 1999).

Challenges to academic development. Vision and hearing impairments have the potential to disrupt students' academic language learning in traditional, mainstream educational settings.

M. Cook and M. Hussey (1995) told the story about the girl who was deaf and blind. She was asked whether she would prefer to have her vision or her hearing if she could have one or the other. She responded that she would prefer to have her hearing since she felt that people who are blind are cut off from things, whereas "those who are deaf are cut off from people" (Farooq, 2015, p. 662).

Students with visual impairments and blindness use *Assistive Technologies for Reading and Writing* in their language learning: technologies that enhance sight capabilities (large print text, typoscopes, reading stands, lamps for improving lighting, lens-based magnification aids, electronic magnification aids); technologies that Engage Senses and Abilities Other than Sight Literature

(Braille reading materials, Braille translation software and computer printers, refreshable braille display, audio format materials, screen and document reading software).

For example, students must learn many key strokes for initiating software having vision disability and blindness can experience difficulties in learning the mechanics of writing (punctuation, spelling), taking notes during classes, and engaging in the various phases of composing (prewriting, drafting, editing) due to limitations of their visual acuity, visual field, and functional use of vision. There are technologies that enhance sight capabilities (paper and writing utensils that provide visual and tactile cues, typoscopes); technologies that engage senses and abilities other than vision (Braille making devices, speech-to-text software voice recorders, text-to-speech software, spelling and grammar checking software).

Students with Hearing Impairments use the following assistive technologies in their language studies: amplification devices (assistive listening device, hearing aids, telecommunication device for the deaf, frequency-modulated amplification systems, audio loops, infrared systems, cochlear implants). Amplified telephone ringers, visual or vibrating systems, live speech captioning are used as well (American Foundation for the Blind. Writing tools for auditory readers; Farooq, 2015; University of Washington: Disabilities, Opportunities, Internetworking, and Technology).

Some additional recommendations for teachers are listed on the *University of Washington Disabilities*, *Opportunities, Internetworking, and Technology* website (Hasselbring, & Glaser, 2000; University of Washington: Disabilities, Opportunities, Internetworking, and Technology).

Areas for future research on assistive technologies for students with disabilities include the reliability and validity of assistive technology assessment methods' outcomes; students' preferences for particular assistive technology supports; the effects of instruction on assistive technologies use; they help compensate for functional human limitations and become a tool that lays the foundation for personal development and facilitates the process of professional development.

Given the paucity of research in these areas and the value of research findings to optimizing the education and development of students, there is a great need for continued work in these areas.

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ВИКОРИСТАННЯ АСИСТИВНИХ ТЕХНОЛОГІЙ У НАВЧАННІ МОВАМ ОСІБ З ПОРУШЕННЯМИ ЗОРУ І СЛУХУ В США

О. Є. Крсек

Ця стаття присвячена вивченню американського досвіду використання асистивних технологій при навчанні мовам студентів з порушеннями зору і слуху в США. Дослідження було зосереджено на допоміжних технологіях для вивчення мови, читання, письма. Елементи допоміжних технологій були згруповані в залежності від того, чи покращують вони зорові або слухові здібності учнів з обмеженими можливостями.

На основі принципів організації мовної освіти в системі мовної політики США обґрунтовано важливість вивчення англійської мови для студентів з порушеннями зору і слуху. Перспективи дослідження застосування допоміжних технологій при навчанні студентів з порушеннями зору і слуху мовам, значення результатів досліджень для оптимізації мовної освіти студентів з порушеннями слуху і зору, зокрема, були показані як велика потреба в продовженні роботи в цих напрямках.

Ключові слова: *асистивні технології, порушення зору і слуху, частотно-модульовані системи посилення слуху учнів з обмеженими можливостями, наочні посібники, мовне навчання.*

ПРИМЕНЕНИЕ АССИСТИВНЫХ ТЕХНОЛОГИЙ ПРИ ОБУЧЕНИИ ЯЗЫКАМ ЛИЦ С НАРУШЕНИЯМИ ЗРЕНИЯ И СЛУХА В США

О. Е. Крсек

Эта статья посвящена изучению американского опыта использования ассистивных технологий при обучении языкам студентов с нарушениями зрения и слуха в США. Исследование было сосредоточено на вспомогательных технологиях для изучения языка, чтения, письма. Элементы вспомогательных технологий были

сгруппированы в зависимости от того, улучшают ли они зрительные или слуховые способности учащихся с ограниченными возможностями.

На основе принципов организации языкового образования в системе языковой политики США обоснована важность изучения английского языка для студентов с нарушениями зрения и слуха. Перспективы исследования применения вспомогательных технологий при обучении студентов с нарушениями зрения и слуха языкам, значение результатов исследований для оптимизации языкового образования студентов с нарушениями слуха и зрения, в частности, были показаны как большая потребность в продолжении работы в этих направлениях.

***Ключевые слова**: ассистивные технологии, нарушения зрения и слуха, частотно-модулированные системы усиления слуха учащихся с ограниченными возможностями, наглядные пособия, языковое обучение.*

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