

THE APPLICATION OF ASSISTIVE TECHNOLOGY IN A SPECIAL PROGRAM FOR ACQUIRING COMPETENCIES IN ACTIVITIES OF DAILY LIVING

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Abstract

Assistive Technology (AT) is increasingly recognised as a key factor in supporting students with developmental disabilities, particularly in the context of acquiring competencies in activities of daily living. Despite a growing body of literature on the effects of AT, practical accounts of its application in special education programs remain scarce, hindering its implementation in everyday professional practice. The aim of this paper is to describe the diversity of assistive technology needs among students with multiple disabilities enrolled in a special program and to present practical ways to implement AT during group work, with an emphasis on the importance of individualised adaptation. The study was conducted at the Centre for Education and Rehabilitation Goljak in Zagreb. The participants were four students from an educational group aged 7 to 11 years with multiple disabilities. A needs assessment was carried out using the WATI (Wisconsin Assistive Technology Initiative) instrument, which is based on the SETT framework and covers communication, motor skills, sensory abilities, organisation, and leisure. Following the assessment, activities for acquiring daily living competencies were designed and implemented using available AT, including Big Points and Talking Brix2 communication devices, GoTalk4+, iTalk4, talking photo albums, switch-operated toys, and a tablet with ICT-AAC applications. Data were analyzed using a qualitative method. The results indicate significant heterogeneity in AT needs within the same educational group, confirming the need for an individualised approach. In all students, increased motivation for participation, longer sustained attention on tasks, and more frequent initiation of expressive communication were observed when using AT. The presented activities demonstrate that the same educational content can be acquired in different ways through various forms of AT, tailored to each student's motor, cognitive, and sensory abilities. The paper emphasises that implementing AT is not a one-time activity but a continuous, collaborative process that requires the professional competencies of educational rehabilitators, systematic assessment, and environmental support. In conclusion, the high-quality, individualised application of AT in special programs can significantly contribute to the development of functional competencies and to increased autonomy and quality of life for students with developmental disabilities.

Keywords: *Assistive Technology, special education program, activities of daily living, individualized approach.*

1. Introduction

Assistive Technology (AT) has been recognised as a significant factor in improving the quality of life of children with developmental disabilities and persons with disabilities (Blackhurst, 2005). Under the Technology Act of 1988, AT is defined as any item, piece of equipment, or product system, whether acquired commercially, modified, or customised, that serves to promote, maintain, or improve the functional capabilities of persons with disabilities (Individuals with Disabilities Education Act, as cited in Hersh & Johnson, 2008). A more accessible definition describes AT as a tool or strategy that enables a person to perform a task they would otherwise be unable to carry out at the expected level of performance (Parette & Peterson-Karlan, 2010). This definition is particularly applicable in the educational-rehabilitational context, where the aim is to bridge the gap between what a person wishes to do and what their existing environment allows them to do (Hersh & Johnson, 2008).

AT ranges from low-tech solutions (communication boards, picture symbols, adapted everyday objects) to mid-tech devices with speech output, and to high-tech systems such as eye-gaze technology and dedicated communication devices (Chambers, 2020; Cook & Polgar, 2015). When considering implementation, it is recommended to first explore the simplest solutions, as they are the most accessible, align with the learner's developmental changes, and are more financially viable (Chambers, 2020).

Globally, more than 2.5 billion people require one or more AT devices (WHO, 2024). Timely and appropriate use of AT can positively influence developmental outcomes, support the acquisition of functional competencies, and reduce dependence on others (Agree & Freedman, 2011; WHO, 2024). In the educational context, AT contributes to autonomy in academic and work-related tasks, more effective participation in classroom activities, more frequent interaction with peers, and the development of self-confidence and greater levels of motivation and attention (Copley & Ziviani, 2006; Fernández-Batanero et al., 2022). The integration of AT into educational activities is associated with higher levels of engagement and, consequently, better learning outcomes (Galeković, 2022).

In the domain of communication, augmentative and alternative communication (AAC) is particularly important, as it does not replace existing modes of communication but rather expands and supports them (Ronski & Sevcik, 2005). For children with complex communication needs, AAC is a prerequisite for expressing a wide range of communicative functions that go beyond conveying basic needs, such as commenting, storytelling, and expressing abstract ideas (Moorcroft et al., 2019).

Despite the growing body of literature on the effects of AT, practical accounts of its application in special programmes are relatively rare, which hinders implementation in everyday professional practice (Pongrac, 2021; Stančić & Pinjatela, 2023). Inadequate assessment of needs, preferences, and priorities has been identified as the main factor in a poor match between the user and the technology (Scherer & Glueckauf, 2005), underscoring the importance of systematic assessment in selecting an appropriate form of AT. The aim of this paper is to describe the diversity of AT needs among pupils in a special programme for the acquisition of competencies in activities of daily living, and to present practical ways of applying AT in group work, with an emphasis on the importance of individualized adaptation.

2. Method

2.1. Participants

The study was conducted at the Goljak Centre for Education in Zagreb during April and May 2024. Non-probability purposive sampling was applied (Miles & Huberman, 1994). Four pupils from an educational group, aged 7 to 11, took part in the study. All pupils presented with multiple disabilities, including cognitive, motor, sensory, speech and language, and emotional and behavioural difficulties. The selection criteria were membership in a group in which the educational rehabilitator already uses or is considering using AT, and heterogeneity of diagnoses within the group, to encompass a range of needs. Ethical integrity was ensured through adherence to the Ethical Code (Committee on Ethics in Science and Higher Education, 2006), with the institution's approval and the written consent of the pupils' parents.

2.2. Assessment instrument

A needs assessment was conducted using the Wisconsin Assistive Technology Initiative (WATI) instrument (Gierach, 2009; WATI, 2018). WATI is based on Zabala's (1995) SETT framework (Student, Environments, Tasks, Tools), which integrates information about the learner, the environment, the tasks, and the tools. The instrument covers fourteen areas of assessment across twelve checklists, including seating and positioning, communication, computer access, motor aspects of writing, reading, mathematics, organisation, leisure, and vision and hearing. WATI was chosen for its comprehensiveness, systematic guidance throughout the process, and the possibility of subsequent outcome monitoring (Wong, 2018).

2.3. Procedure

Data were collected using structured observation (Ciesielska et al., 2017) under the supervision of the special education and rehabilitation specialist. Following the assessment, AT recommendations were formulated for each pupil, and activities to acquire daily living competencies were designed and implemented using available AT. The available AT included: Big Points communicators, Talking Brix2, GoTalk4+, iTalk4, talking photo albums, a talking mat, a daily visual schedule, a switch-adapted toy (Bubble Machine fish), and a tablet with applications from the ICT-AAC project (KuhARica, Prepoznaj pojmove, Učimo pojmove, Gibalica, e-Galerija, and Pisalica). Some of the devices were borrowed from the Laboratory for Assistive Technologies and Alternative and Augmentative Communication at the Faculty of Electrical Engineering and Computing, University of Zagreb. The data were analysed qualitatively.

3. Results

3.1. Diversity of needs within the group

The assessment results confirmed marked heterogeneity of AT needs within the same educational group. Pupil A (9 years old) presents with cognitive and motor difficulties, as well as visual impairment. The pupil is non-verbal and communicates through vocalisations, gestures, and, to some extent, pictorial symbols. Given the visual impairment, recommendations include high-contrast pictorial symbols with clearly isolated backgrounds and enlarged dimensions, talking photo albums with auditory support, switch-adapted assistive toys, and the introduction of a lap tray on the wheelchair to bring materials closer to the pupil's field of view.

Pupil B (8 years old), who presents with features of autism spectrum disorder alongside cognitive, emotional and behavioural difficulties, shows a pronounced need for movement and frequent changes of position. It is recommended that the pupil continue using the communication board, with gradual expansion of the symbol set, a talking mat, and the iTalk4 with a linear key arrangement, as the GoTalk4+ grid layout is too demanding for this pupil. In addition, a T-stool or a ball chair is used to meet vestibular and proprioceptive needs during table-based work.

Pupil C (10 years old) presents with speech and language, cognitive, and motor difficulties, along with a diagnosis of epilepsy. Although the pupil verbally reproduces individual words, delayed echolalia is present, along with sensitivity to loud and cold auditory and tactile stimuli. It is recommended to mount tablet-based ICT-AAC applications on the wheelchair to compensate for the limitations imposed by fine-motor difficulties and stereotyped head movements, thereby providing a wider visual field and easier symbol selection. Musical and auditory components have proven to be strong motivators for this pupil.

Pupil D (8 years old), who is verbal but presents with speech and language difficulties, has been identified as having the potential for the introduction of a more complex communicator, such as the DialoQ Talk, and a tablet with ICT-AAC applications, all with the aim of supporting expressive language, initiating interaction with peers, and developing pre-reading and pre-writing skills.

3.2. Application of AT in group activities

The activities were designed to integrate several curricular areas, including self-care, communication, work education, creativity development, and socialisation. The activities themselves involved preparing pancakes, learning fruits and vegetables, distinguishing colours, identifying body parts, learning emotions, and pre-writing exercises.

In the food preparation activity, Big Points communicators were paired with specific food items and kitchen utensils, thereby supporting differentiation, naming, and multisensory acquisition of concepts. A talking photo album was used to display the sequence of steps in preparing the dish, and, in the unit on the body, to tell a simple story with auditory and visual support. GoTalk4+ and iTalk4 were used in the repetition and matching phases; for pupils for whom the grid arrangement of four symbols proved too demanding, the iTalk4 with a linear arrangement was used. Talking Brix2 was used in the active game "Day and Night", in which a non-verbal pupil with motor difficulties took on the role of issuing instructions to a peer, thus achieving active participation in joint play despite motor limitations. The switch-adapted toy functioned as a motivator for completing activities and as a means of supporting the development of understanding of cause-and-effect relationships.

The tablet with ICT-AAC applications proved to be a versatile platform. The KuhARica application, with the addition of a lap tray to facilitate scanning AR markers, was used to learn about fruits and vegetables. The Prepoznaj pojmove and Učimo pojmove applications were then used to revise colours and body parts, while the Gibalica application was used to develop coordination and body awareness. Finally, the e-Galerija application was used to create a story about emotions, and the Pisalica application for pre-writing exercises with the pupil who showed potential in this area. For pupils with more pronounced motor difficulties, the choice was adapted by reducing the number of offered images from three to only two and by using a Velero strip with concrete objects as a more tactile interface.

During all activities, all four pupils showed increased motivation to participate, longer maintenance of attention on task, and more frequent initiation of expressive communication. Auditory feedback, in the form of praise from the applications and the playback of recorded sound clips on the communicators, consistently served as a strong motivator, enabling pupils to remain engaged in the activity for longer periods.

4. Discussion

The findings obtained corroborate those of earlier studies, which emphasise the diversity of AT users' needs and the necessity of an individualised approach (Ravneberg & Söderström, 2017; Scherer & Glueckauf, 2005). The fact that, within a group of only four pupils, needs were identified for AT devices of varying levels of complexity, ranging from low-tech pictorial symbols and talking mats to high-tech tablets with AAC applications, confirms the AT continuum as a functional concept in practice (Chambers, 2020). It was precisely the possibility of conveying the same educational content, such as body parts, emotions, or food items, through different technological formats that enabled the inclusion of all pupils, despite their differing abilities.

The observed increase in motivation and the more frequent initiation of expressive communication is consistent with the literature linking AT to greater independence, self-confidence, and social inclusion (Fernández-Batanero et al., 2022; Galeković, 2022; Stafford, 2005). It is important to emphasise that AT is not merely a set of devices but also includes so-called soft components, including services, training, support, and environmental adaptation (Cook & Polgar, 2015). The implementation of AT is therefore not a one-off activity but a continuous collaborative process, in which the competencies of special education and rehabilitation specialists, systematic assessment, and support from the family and the wider environment play a key role (Gierach, 2009; Lahm et al., 2001; Reed & Bowser, 2013). In the Croatian context, Pongrac (2021) and Stančić and Pinjatela (2023) highlight the need for additional training for professionals, specifically in AT assessment and implementation, a need likewise confirmed by the experiences reported in the present study.

The limitations of the study include the small number of participants, the short implementation period, and the inability to monitor the long-term effects of the recommended AT or to involve parents more systematically in the assessment process. For future research, a longitudinal design with outcome evaluation is recommended, along with the systematic inclusion of families across all phases of the SETT framework.

5. Conclusion

High-quality, individualised application of AT in special programmes for the acquisition of competencies in activities of daily living can make a significant contribution to the development of functional skills and to increased autonomy and quality of life for pupils with developmental disabilities. The examples presented demonstrate that the same educational content can be effectively conveyed through various forms of AT, with adaptations tailored to each pupil's motor, cognitive, and sensory abilities. A thorough assessment process, such as the one enabled by the WATI instrument, continuous professional support, and investment in the training of educational rehabilitators represent the key prerequisites for realising the full potential of AT in educational-rehabilitational practice.

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