

**APPLICATION AND DEVELOPMENT PROSPECTS OF ARTIFICIAL
INTELLIGENCE TECHNOLOGIES IN SPEECH AND LANGUAGE THERAPY**

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Abstract: This article presents a comprehensive analysis of modern technologies, emerging artificial intelligence (AI) tools, and various supportive devices aimed at engaging children’s attention. Particular emphasis is placed on the significance of these technologies in the field of speech and language therapy, their practical benefits, as well as their positive and negative impacts on speech formation during a child’s ontogenetic development. In addition, the study examines the future development prospects and potential applications of these technologies for future generations.

Keywords: artificial intelligence, audio classification, automatic speech recognition (ASR) technology, digital technology, corrective intervention system.

Introduction

It is widely recognized that the twenty-first century is an era characterized by the rapid advancement of information technologies. In this century, the development of science and technology has deeply penetrated all spheres of human life. In particular, the accelerated growth of digital technologies and artificial intelligence (AI) systems has led to fundamental transformations in the fields of education, medicine, psychology, and special pedagogy. This process has not bypassed the field of speech therapy; on the contrary, the significance of modern technologies in the identification, analysis, and correction of speech disorders continues to increase.

Speech therapy is a scientific discipline concerned with the study, prevention, and remediation of speech disorders and is closely interconnected with special pedagogy and medicine. In recent years, the increasing prevalence of various speech development disorders among children, including **dyslalia, dysarthria, and alalia**, has necessitated the adoption of new approaches within this field. Although traditional speech therapy methods remain important, under modern conditions they may not always provide sufficient effectiveness. Therefore, the integration of innovative technologies, particularly artificial intelligence systems, into practical speech therapy has become increasingly essential.

At the same time, the application of artificial intelligence technologies in speech therapy creates not only new opportunities but also certain challenges. These include excessive dependence on technology, insufficient accuracy of software applications, and the lack of adequate technical infrastructure across all regions. Nevertheless, the scientific study and practical implementation of these technologies remain among the most relevant and pressing issues of the present day.

Materials and Methods

Artificial intelligence technologies represent innovative tools that facilitate the detection and analysis of speech disorders while enabling the personalization of corrective intervention strategies[1]. This demonstrates that technology has the potential to assist in identifying various speech impairments manifested in children’s speech. In particular, educational tools equipped with specialized software including smart learning desks, tablets, and even smartphones can be employed to detect pronunciation deviations, analyze vocal intonation, and determine the degree of strain or irregularity in speech rate.

For example, a study conducted in 2024 in the field of Speech Sound Disorder Research demonstrated that speech impairments in children can be identified through the use of Automatic

Speech Recognition (ASR) and audio classification technologies[2]. The primary objective of this classification system was to distinguish between the types and severity levels of speech disorders. According to the study, children's speech samples were recorded using specialized software, and the artificial intelligence system analyzed the speech sounds contained within these recordings. The system was specifically designed to detect mispronunciations, omission of certain phonemes, sound substitutions, and articulatory errors.

While Automatic Speech Recognition (ASR) technology automatically converted the child's spoken words into text, the audio classification system analyzed the acoustic characteristics of speech sounds to identify differences between typical and impaired speech patterns. As a result, the artificial intelligence model was able to distinguish children with speech disorders with a high degree of accuracy. This approach creates practical advantages and greater convenience both for the child and for the special education specialist working with them.

Automatic Speech Recognition (ASR) refers to a technology that enables the automatic conversion of human speech into written text through computer-based processing systems[3]. This technology may be compared to audio recording tools commonly used in everyday life. In daily practice, many audio-based applications are capable of listening to human speech and converting it into a coherent textual format. Similarly, in Automatic Speech Recognition (ASR) technology, the computer processes the child's speech by recognizing individual sounds, words, and sentences, subsequently transforming them into a complete textual representation.

Speech therapy sessions organized on the basis of digital technologies contribute to the development of motivation and independent learning skills among children[4]. This is undoubtedly highly beneficial not only for children engaged in independent learning but also for parents. The development of such technologies creates broad opportunities by reducing geographical barriers, enabling parents to independently teach their children correct pronunciation norms, and increasing their awareness of activities designed to stimulate the effective functioning of various articulatory organs. By understanding the specific sounds or letters with which a child experiences pronunciation difficulties, mothers and fathers can independently engage in corrective practice with their children through the support of these technological tools.

The use of digital technologies influences not only the family environment but also demonstrates considerable effectiveness in organized speech therapy sessions. In particular, digital technology programs developed for group-based interventions contribute significantly to children's socialization and facilitate their more rapid integration into society. For example, a mobile application entitled "Tilim Ravon" ("My Speech is Fluent") was developed, and its various advantages were examined. The application primarily focuses on assessing children's speech fluency, their ability to appropriately use words in sentences, and the characteristics of intonation, such as vocal expressiveness or monotony, in order to identify aspects of the child's behavioral profile. Consequently, this approach contributes to the development of children's independent learning skills and promotes the acquisition of competencies related to the effective and appropriate use of such technologies.

The capabilities of artificial intelligence facilitate the professional activities of speech therapists and provide opportunities for rapid monitoring of the corrective intervention process[5]. This demonstrates that artificial intelligence technology not only contributes to the activation and development of children's speech but also offers promising opportunities in designing corrective intervention programs for speech therapists and special education specialists. First and foremost, it provides greater convenience for speech therapists by enabling them to manage corrective intervention systems through specialized software platforms. Such programs allow specialists to incorporate individualized corrective strategies while also obtaining

additional recommendations and information through artificial intelligence systems. Consequently, these technologies serve as a key factor in ensuring the systematic, organized, and consistent implementation of corrective intervention processes.

Conclusion

The use of artificial intelligence technologies has become a fundamental requirement of the modern era. The implementation of such tools contributes to increasing the efficiency of professional practice, stimulating children's interest, and facilitating more accessible and effective corrective interventions, thereby enhancing the overall intervention process. The application of these technologies creates substantial opportunities not only for children but also for their parents and the educators and specialists involved in their development.

Furthermore, the rational use of artificial intelligence technologies improves the accuracy and efficiency of speech therapy diagnostics and corrective intervention processes. In particular, digital programs developed on the basis of individualized approaches enable the organization of activities tailored to each child's speech capabilities, developmental level, and specific needs. This, in turn, significantly enhances the effectiveness of corrective interventions. Moreover, AI-based platforms expand opportunities for remote speech therapy support, reducing geographical and time-related limitations. Parents are able to continuously monitor their child's developmental progress, while educators and speech therapists can analyze outcomes and effectively plan subsequent intervention strategies.

However, maintaining moderation and balance in the use of artificial intelligence technologies remains equally important. Although such technologies function as supportive tools that facilitate the work of speech therapists and educators, they cannot fully replace the specialist's direct interaction and individualized pedagogical approach. Particularly in work involving children, emotional connection, encouragement, and psychological support play a crucial role. In addition, excessive use of digital devices may negatively affect a child's visual functioning, attention span, and social communication skills. Therefore, AI-based programs should be implemented within appropriate time limits and with careful consideration of age-related and individual characteristics. The integration of technological tools with traditional speech therapy methods is regarded as one of the most effective approaches to intervention practice.

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