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THE EFFECTIVENESS OF USING DIGITAL TECHNOLOGIES (MOBILE APPLICATIONS, VIRTUAL REALITY AND ARTIFICIAL INTELLIGENCE-BASED TOOLS) IN CHILDREN WITH SPEECH DISORDERS: FOREIGN EXPERIENCE AND PROSPECTS FOR IMPLEMENTATION IN UZBEKISTAN

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Abstract: This article analyzes the effectiveness of using digital technologies, in particular mobile applications, virtual reality (VR) and artificial intelligence (AI)-based tools, in working with children with speech disorders. Based on the experience of foreign countries, the advantages, opportunities and limitations of digital technologies in speech therapy are highlighted. Also, the prospects for introducing these technologies in the conditions of the education and healthcare system of Uzbekistan, existing problems and ways to overcome them are considered.

Keywords: speech disorders, children's speech, digital technologies, mobile applications, virtual reality, artificial intelligence, speech therapy, logopedics, inclusive education, remote rehabilitation

INTRODUCTION

Today, speech disorders are one of the most common problems in the development of children. Speech disorders negatively affect not only the child's ability to communicate, but also his psychological state, social adaptation and success in the educational process. Although traditional speech therapy approaches are important, modern digital technologies are creating new opportunities in this area. In recent years, mobile applications, virtual and augmented reality technologies, as well as tools based on artificial intelligence have been widely used as effective assistants in working with children with speech disorders.

Foreign experience shows that digital technologies make speech therapy sessions more interesting, individual and effective. This article analyzes the effectiveness of digital technologies in working with children with speech disorders, foreign experience and the prospects for their implementation in Uzbekistan. Speech disorders (speech disorders) are manifested by violations in the communication, pronunciation, phonetic and lexical abilities of children and can hinder their socio-educational process. Despite the effectiveness of traditional speech therapy rehabilitation methods, technological approaches are creating new opportunities for providing interesting and constantly repeated exercises adapted to the individual needs of the child. In today's globalization environment, the introduction of digital technologies into education and rehabilitation serves to develop inclusive education.

Effective approaches to identifying, monitoring, and correcting speech disorders are being developed using mobile applications, virtual reality (VR/AR) environments, and artificial intelligence (AI) systems. Positive communication and speech restoration are important factors in child development. Speech disorders significantly affect a child's social functioning, education, and self-confidence. Along with traditional speech therapy, digital technologies — mobile applications, virtual and augmented reality (VR/AR), and artificial intelligence (AI) — are widely used as innovative approaches in speech therapy. This article reviews the effectiveness of digital technologies based on foreign experience, and then analyzes the prospects for their implementation in Uzbekistan.

Main part

International studies show that the effectiveness of digital applications in speech therapy is highly appreciated. For example, in a study that analyzed the opinions of speech therapists and

parents in one of the American scientific journals, 88% of parents expressed support for the use of mobile applications at home. These applications provide continuous exercises between traditional therapy sessions, increase the child's participation and allow for progress monitoring. In addition, pilot studies have shown that special digital speech therapy applications reduce stuttering, reduce the number of pronunciation errors and increase confidence in social communication. Foreign scientific literature emphasizes the advantages of using VR and AR technologies in speech therapy.These technologies allow children to practice speaking in realistic social situations in a stress-free manner. For example, in a VR environment, interactive speaking exercises are organized through situations such as communicating in a store or having a conversation in a salon, which is both interesting and effective for the child. AR, on the other hand, adds digital elements to real-world objects, making speaking exercises more interactive and keeping the child's attention for a long time.

Speech disorders and their impact on children's development

Speech disorders are understood as incorrect pronunciation of sounds, delayed speech development, stuttering, insufficient grammatical and lexical formation of speech. Such problems seriously hinder the child's ability to freely express his thoughts, communicate with peers, and the learning process. Numerous studies have shown that if speech disorders are not eliminated in a timely manner, the child's self-confidence decreases, social activity is limited, and academic difficulties arise. Therefore, it is important to organize speech therapy from an early age and use modern and effective methods.

The role of digital technologies in speech therapy

Mobile applications

Mobile applications are one of the most convenient and popular tools for eliminating speech defects. Through these applications, children perform exercises aimed at correct pronunciation of sounds, increasing vocabulary, sentence construction and speech development in a playful way. The main advantage of mobile applications is that they interest the child, allow independent training, and also serve as a convenient control tool for parents. In addition, the applications allow you to monitor the dynamics of the child's development and select individual exercises.

Virtual and Augmented Reality Technologies

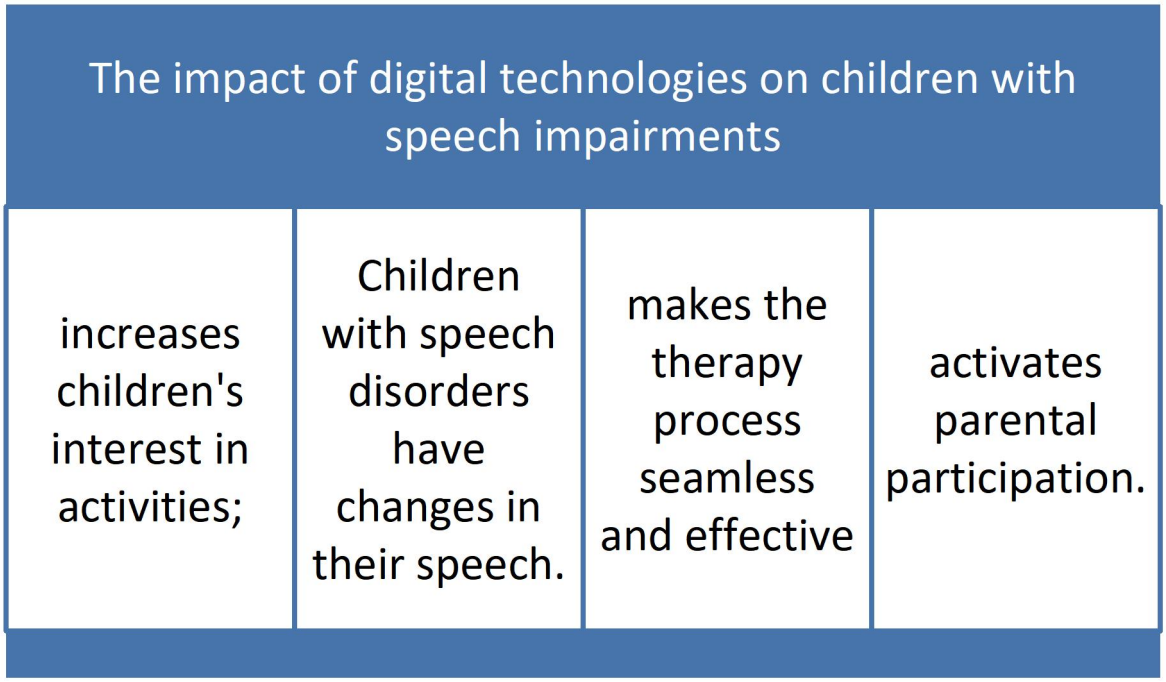
Virtual reality (VR) and augmented reality (AR) technologies have introduced a new approach to speech therapy. With the help of these technologies, the child experiences various life situations in an artificially created environment and practices speech activity in conditions close to natural conditions. For example, by shopping in a store, talking or communicating in public places in a virtual environment, the child develops speech confidence and activity. AR technologies, on the other hand, increase the child's attention through interactive exercises connected to real objects and make the learning process more effective.

Artificial intelligence-based tools

Artificial intelligence (AI) technologies play an important role in automatic speech recognition, error analysis, and the creation of individual correction programs. AI-based systems identify deficiencies in a child's pronunciation and provide recommendations in real time. Such technologies facilitate the work of speech therapists, allow for personalization of classes, and help create an individual plan that is appropriate for the child's development. Foreign experience has shown that artificial intelligence-based programs have significantly increased the effectiveness of speech therapy.

Foreign experience

In developed countries, digital technologies have become an integral part of speech therapy. Mobile speech therapy applications, VR-based training, and AI diagnostic systems are widely used in the United States, European countries, and Asian countries.



Prospects for implementation in Uzbekistan

The digitalization of the education system and the development of inclusive education in the Republic of Uzbekistan are one of the priorities of state policy. The necessary conditions for the introduction of digital technologies in preschool and school educational institutions are being gradually created.

The introduction of digital technologies in working with children with speech disorders can be carried out in the following areas:

- creation of special digital platforms for speech therapists;
- development of mobile speech therapy applications suitable for the Uzbek language;
- organization of advanced training courses for teachers and specialists;
- provision of methodological instructions to parents on the use of digital tools at home.

Digital products created in collaboration with local specialists and IT representatives can be suitable and effective for the conditions of Uzbekistan.

Problems and limitations

Along with the advantages of digital technologies, there are also some problems. In particular:

- excessive use of technologies can have a negative impact on children's health;
- technical capabilities are not the same in all regions;
- there is a possibility that specialists may not have sufficient digital literacy.

Therefore, it is advisable to use digital technologies as a means of complementing traditional speech therapy methods, rather than completely replacing them.

Table 1. The use of digital technologies in children with speech disorders: comparison of foreign experience and conditions in Uzbekistan

Comparison criterion	Experience of foreign countries	Conditions in Uzbekistan
General level of digital technology	Digital technologies are widely integrated into the	Digital technologies are being introduced, but not yet

	speech therapy system, supported by the public and private sectors.	fully and systematically.
Use of mobile applications	Specialized speech therapy mobile apps (for pronunciation, stuttering, vocabulary) are widely used	General developmental and interactive applications are used, while special speech therapy applications are rare.
Artificial Intelligence (AI)-based tools	AI automatically analyzes speech, identifies errors, and creates an individual therapy plan	AI-based tools have hardly been implemented in speech therapy practice

CONCLUSION

In conclusion, digital technologies are a highly effective modern approach to working with children with speech disorders. Mobile applications, virtual reality and artificial intelligence-based tools increase motivation in the development of a child's speech, provide an individual approach and make the therapy process more interesting. In the conditions of Uzbekistan, it is possible to form a more effective education and rehabilitation system for children with speech disorders through the gradual introduction of these technologies, the creation of national content and the improvement of the skills of specialists.

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