SUN’IY INTELLEKTGA ASOSLANGAN TA’LIMIY RESURSLARGA QO‘YILADIGAN TALABLARNING ILMIY-NAZARIY ASOSLARI

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Annotatsiya: Ushbu maqolada O‘zbekiston Respublikasida sun’iy intellekt (SI) asosidagi ta’limiy resurslarga qo‘yiladigan talablar tahlil qilingan. Tadqiqotda texnik va dasturiy talablar, didaktik va pedagogik talablar, foydalanuvchilarga moslashuvchanlik, ma’lumotlar xavfsizligi, innovatsion va ilmiy jihatlar hamda huquqiy va me’yoriy talablar batafsil o‘rganilgan. Natijalar asosida sun’iy intellekt asosida ishlab chiqilgan ta’limiy resurslarni samarali qo‘llash uchun kompleks tavsiyalar berilgan.

Kalit so‘zlar: sun’iy intellekt, ta’limiy resurslar, texnik talablar, pedagogik talablar, adaptiv ta’lim, axborot xavfsizligi, innovatsion ta’lim, huquqiy talablar.

НАУЧНО-ТЕОРЕТИЧЕСКОЕ ОБОСНОВАНИЕ ТРЕБОВАНИЙ К ОБРАЗОВАТЕЛЬНЫМ РЕСУРСАМ НА ОСНОВЕ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА

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Аннотация: В статье анализируются требования, предъявляемые к образовательным ресурсам на основе искусственного интеллекта (ИИ) в Республике Узбекистан. Подробно рассмотрены технические и программные требования, дидактические и педагогические аспекты, адаптивность к пользователям, безопасность данных, инновационные и научные подходы, а также правовые и нормативные требования. На основе результатов исследования даны комплексные рекомендации по эффективному внедрению образовательных ресурсов на основе ИИ.

Ключевые слова: искусственный интеллект, образовательные ресурсы, технические требования, педагогические требования, адаптивное обучение, информационная безопасность, инновационное образование, правовые требования.

SCIENTIFIC AND THEORETICAL BASIS OF THE REQUIREMENTS FOR EDUCATIONAL RESOURCES BASED ON ARTIFICIAL INTELLIGENCE

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Annotation: The article analyzes the requirements for educational resources based on artificial intelligence (AI) in the Republic of Uzbekistan. Technical and software requirements, didactic and pedagogical aspects, user adaptability, data security, innovative and scientific approaches, as well as legal and regulatory requirements are studied in detail. Based on the research results, comprehensive recommendations are provided for the effective implementation of AI-based educational resources.

Keywords: artificial intelligence, educational resources, technical requirements, pedagogical requirements, adaptive learning, information security, innovative education, legal requirements.

Introduction: The “Strategy for the Development of Artificial Intelligence Technologies until 2030” was approved by the Resolution of the President of the Republic of Uzbekistan dated October 14, 2024 No. PQ-358 [1]. One of the main tasks of this strategy is to improve the knowledge and skills of the population, as well as to develop human resources. Ensuring the implementation of the tasks set out in this resolution creates a need for educational resources based on artificial intelligence. The development of educational resources based on artificial intelligence is an absolutely new area in school education today, and it has its own requirements, which we will analyze in detail below.

The requirements for educational resources based on artificial intelligence (AI) in specialized schools are divided into the following main criteria:

I.Technical and software requirements

The technical and software requirements for AI-based educational resources in specialized schools include the following aspects:

1. Compatibility and integration. Integration of AI technologies into existing educational platforms and systems:

Modular architecture: AI-based educational resources should have a modular architecture, which allows them to be easily integrated with various educational platforms.

Standardized APIs: Resources should interact with other systems through standardized application programming interfaces (APIs). This approach ensures data exchange and functional compatibility between different platforms.

Data format compatibility: It is important to use common data formats for data exchange between different systems. This simplifies the integration process and prevents data loss.

2. Security and Privacy. Protecting students’ personal information:

Data encryption: Student personal information should be protected by modern encryption methods during storage and transmission.

User consent: Explicit consent should be obtained from users before collecting and processing personal information. This process helps users understand how their information will be used.

Privacy policy: Resources should have a clear and understandable privacy policy that informs users about how their information is protected.

3. Multi-platform. The way resources work correctly on different devices:

Responsive design: Resources should have a responsive design, which allows them to be displayed correctly on computers, tablets and mobile devices.

Cross-platform compatibility: Resources should be compatible with different operating systems (Windows, macOS, iOS, Android). This allows users to use the resources on the devices of their choice.

Cross-browser compatibility: Resources should work correctly on different web browsers (Chrome, Firefox, Safari, Edge). This takes into account the fact that users use different browsers.

4. Localization and adaptive UI/UX. Uzbek-language interface and content and user-friendly design:

Language support: Resources should fully support the Uzbek language, including text, audio, and video materials in Uzbek.

Cultural compatibility: The content and interface should be culturally appropriate, that is, they should take into account the cultural and social characteristics of students.

User experience: The interface should be intuitive and easy to use, which ensures that students use the resources effectively.

5. Offline capability. Ability to view important information even when not connected to the Internet:

Latent data synchronization: Resources should be able to work even when not connected to the Internet and automatically synchronize data when the connection is restored.

Local storage: Important information should be stored in the device's memory and be available even when not connected to the Internet.

Resource Lightness: Resources for offline use should be lightweight and fast-loading, taking into account the limited resources of the device.

These technical and software requirements are aimed at ensuring the efficient and secure operation of AI-based educational resources in specialized schools.

Literature Review

An Intelligent Tutoring System (ITS) is a tutoring system based on artificial intelligence that adapts to the specific needs of each student [2].

Using Bayesian Networks, AI can analyze a student’s level of knowledge and recommend tasks that are appropriate for them [3].

Analyzing test results using chatbots – AI systems such as IBM Watson can identify, analyze, and provide recommendations to students [4].

The project is developing components such as interactive tests, online student activity monitoring, assessment, and reporting. This serves to optimize the educational process using tools that provide interactivity based on artificial intelligence [5].

Studies on virtual laboratories show that this technology expands students’ opportunities for experiential learning. For example, in STEM subjects, virtual laboratories help organize practical training in a safe and cost-effective way [6].

Conclusion

The development of educational resources based on artificial intelligence is a completely new area in school education today, and it has its own requirements, which we will analyze in detail below.

The requirements for educational resources based on artificial intelligence (AI) in specialized schools are divided into the following main criteria:

I. Technical and software requirements

The technical and software requirements for AI-based educational resources in specialized schools include the following aspects:

1. Flexibility and integration. Integration of AI technologies into existing educational platforms and systems:

Modular architecture: AI-based educational resources should have a modular architecture, which allows them to be easily integrated with various educational platforms.

Standardized APIs: Resources should communicate with other systems through standardized application programming interfaces (APIs). This approach ensures data exchange and functional compatibility between different platforms. Data format compatibility: It is important to use common data formats for data exchange between different systems. This simplifies the integration process and prevents data loss.

2. Security and Privacy. Protecting student personal information:

Data encryption: Student personal information should be protected by modern encryption methods during storage and transmission.

User consent: Explicit consent should be obtained from users before collecting and processing personal information. This process helps users understand how their information will be used.

Privacy Policy: Resources should have a clear and understandable privacy policy that informs users about how their information is protected.

3. Multi-platform. The way resources work correctly on different devices:

Responsive design: Resources should have a responsive design, which allows them to be displayed correctly on computers, tablets, and mobile devices.

Cross-platform compatibility: Resources should be compatible with different operating systems (Windows, macOS, iOS, Android). This allows users to use the resources on the devices of their choice.

Cross-browser compatibility: Resources should work correctly across different web browsers (Chrome, Firefox, Safari, Edge). This takes into account the fact that users use different browsers.

4. Localization and responsive UI/UX. Uzbek-language interface and content and user-friendly design:

Language support: Resources should fully support the Uzbek language, including providing text, audio, and video materials in Uzbek.

Cultural relevance: The content and interface should be culturally relevant, i.e., take into account the cultural and social characteristics of the learners.

User experience: The interface should be intuitive and easy to use, ensuring that learners use the resources effectively.

5. Offline capability. Ability to view important information even when not connected to the Internet:

Latent data synchronization: Resources should be able to work even when not connected to the Internet and automatically synchronize data when the connection is restored.

Local storage: Important information should be stored in the device's memory and be available even when not connected to the Internet.

Resource lightness: Resources for offline work should be light and fast to load, taking into account the limited resources of the device.

These technical and software requirements are aimed at ensuring the effective and safe operation of educational resources based on artificial intelligence in specialized schools.

Methods

During the study, methods of analysis, generalization and systematization were used. At the same time, literature, legislative documents and international experience were studied in the following main areas:

- Technical and software requirements
- Didactic and pedagogical requirements
- Compatibility with the educational process and users
- Information and data security
- Innovative and scientific aspects
- Legal and regulatory requirements
- Results

According to the results of the study, the following requirements were identified for educational resources based on artificial intelligence:

Technical and software requirements: Modular structure, standardized API interfaces, adaptability to different platforms, the ability to work offline and ensure a high level of security.

Didactic and pedagogical requirements: Individualized and adaptive learning, automatic assessment systems, real-time knowledge monitoring.

Adaptation to the educational process and users: Interactive and gamification-based educational tools, support for multilingualism, and creation of support systems for teachers.

Information and data security: Implementation of mechanisms for data protection, security monitoring and prevention of fake information.

Innovative and scientific aspects: Integration with virtual reality (VR), augmented reality (AR), blockchain technologies, development of algorithms based on educational psychology and pedagogical research.

Legal and regulatory requirements: Compliance with state educational standards, implementation of certification and licensing processes according to pedagogical requirements.

Discussion: The integration of artificial intelligence technologies into the educational process increases the quality and efficiency of education. However, there are also a number of problems associated with this process. In particular, the security of personal data remains a pressing issue. Artificial intelligence technologies collect and process a large amount of personal and academic data, which increases the risk of

illegal use and disclosure of data. To solve this issue, it is necessary to use modern encryption technologies and introduce strict legal standards for the protection of personal data.

In addition, there are cases of overconfidence in technology. If teachers and students rely too much on artificial intelligence technologies in the educational process, this can lead to a decrease in the human factor. Therefore, it is important to maintain a balance between technology and the human factor in the educational process. It is necessary to effectively and rationally integrate artificial intelligence technologies, while maintaining the pedagogical role of teachers, using their methodological and creative capabilities.

It is also important to balance pedagogical and technological requirements, to combine innovative technologies with pedagogical methodologies. When implementing technological solutions, it is necessary to take into account the results of educational psychology and modern pedagogical research based on pedagogical aspects. This will not only increase the effectiveness of the educational process, but also increase students' motivation and interest in the educational process.

Conclusion: Thus, for the effective and safe use of educational resources based on artificial intelligence, it is necessary to fulfill the established requirements in a comprehensive manner. These requirements not only increase the quality of the educational process, but also serve to create a flexible and interactive educational environment that takes into account the individual characteristics of students. In addition, the widespread use of artificial intelligence technologies in the pedagogical process also contributes to the development of innovative pedagogical methodologies in the education system. However, it is important to address existing problems when introducing these technologies, in particular, to take into account issues such as information security and reducing the human factor. In the future, there is a need to consistently implement these requirements and recommendations in order to further increase the efficiency of the education system, train highly qualified specialists, and create a globally competitive educational environment.

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