

## INFORMATIZATION IN SCIENCE AND EDUCATION: MODERN TRENDS AND OPPORTUNITIES

**Ulugbek Saliev**

*associate professor,*

**Nigora Salieva**

*senior teacher,*

**Oftobkhon Muminova**

*lecturer,*

**Madinabonu Karimova**

*lecturer, Fergana Medical Institute of Public Health,*

*Fergana, Uzbekistan*

**Abstract:** *This article analyzes the importance of information and communication technologies (ICT) and digitalization in the educational process, as well as the trends in effective use of modern educational platforms and electronic resources. The role of informatization in scientific research, expanding access to knowledge, and its positive impact on the quality of education are also discussed. The article focuses on the possibilities of using innovative technologies in contemporary learning processes and ways to enhance their effectiveness.*

**Keywords:** *informatization, education, modern trends, digitalization, e-learning, innovations*

### INTRODUCTION

Nowadays, the importance of informatization in the field of science and education is steadily increasing. Information and communication technologies (ICT) have become a key factor in improving the educational process, expanding access to knowledge, and positively influencing the quality of education. Digital technologies and electronic learning platforms are transforming modern educational systems and fostering interactive collaboration between teachers and students.

Moreover, analyzing the role of informatization, innovative methods, and modern trends in scientific research reveals opportunities to improve educational effectiveness. This article examines these trends, their possibilities, and both scientific and practical significance [1, 45].

### MAIN PART

At the current stage of our country's development, profound qualitative changes are taking place in all spheres of our society. It is an undeniable fact that achieving this great goal is directly connected with enhancing the intellectual potential of our citizens. This, in turn, is closely related to establishing an effective system of education and upbringing. To

achieve this, first and foremost, it is necessary to organize and refine the theoretical foundations of education and upbringing.

Today, global development is taking place in an information and innovation era. The driving force of this process consists of scientific achievements, the rapid adoption of new technologies, and changes based on effective management. As a result, relations related to the exchange and implementation of innovations among economic entities are becoming increasingly evident.

The issue of studying the concept of the “information flow” from a scientific perspective has later become an integral part and source of philosophical knowledge. However, in defining and classifying this concept, there are also some one-sided and unscientific approaches. Therefore, understanding correctly the scope and regularities of the origin and development of the information flow plays an important methodological role in its further advancement.

In modern literature, the term “informatization” is often used as a synonym for “electrification,” “computerization,” and “automation.” However, these concepts differ in their philosophical status. For this reason, some researchers who fail to grasp these differences interpret informatization as the same thing as computerization.

“Information culture,” in turn, manifests itself in the ability to store information, identify its important aspects, classify it by fields, ensure its integrity, express an attitude toward it, determine its ideological foundations, and identify the source of information. Furthermore, information culture possesses both technical-technological and socio-cultural dimensions.

Today, the process of informatization of society is encompassing the economic, political, socio-cultural, and other aspects of social life. Consequently, informatization is a multifaceted process in which technical-technological, social, economic-political, and cultural dimensions are carried out in harmony.

In such a society, profound changes take place not only in the spheres of production and technology but also in the socio-economic and spiritual life. It is well known that any field of activity develops through extensive and intensive means. The process of informatization is no exception. In its initial stages, extensive development prevails, which is later replaced by intensive development. The extensive method began with the advent of the computer.



Informatization is the process of effectively managing and developing the activities of a society, organization, or individual through the extensive use of information and communication technologies (ICT). In other words, informatization involves the collection, storage, transmission, and analysis of information. This process helps automate human activity and increase efficiency.

In the modern world, information technologies and communication tools are creating a revolution in science and education. Informatization is widely applied at all levels of education – from schools to universities – as well as in scientific research and communication. It not only enables faster and more efficient information exchange but also fundamentally transforms the processes of knowledge acquisition and creation.

The concept of informatization involves creating a large-scale system that generalizes structured information technologies, covering the processes of searching, collecting, storing, processing, and providing the information necessary for activity.

“At all stages of societal development, moral norms have been established and utilized. It is known that information is extremely necessary for human development. Therefore, information is the fourth vital element” [2, 98].

Information is increasingly becoming a strategic resource for states, a productive force, and a valuable product. Human progress leads to new discoveries, which often arise in overcoming obstacles during the process of innovation. One of the greatest discoveries of the 20th century is the computer. Over time, computer technologies have developed significantly.

“Modern human learning is not limited to kindergarten, school, lyceum, college, or university. Lifelong learning is necessary. Thus, continuous education is a demand of our time. Consequently, the need for modern information technologies has emerged. In the 21st century, informatization requires:

- informatization of teaching and learning processes;
- informatization of educational institution management;
- informatization of departments;
- informatization of the educational environment” [3, 14].

The rapid growth of information has led to the development of computers and the widespread computerization of society. The emergence of a fully informatized system has connected nations and humanity globally [4, 26].

One of the main directions of the informatization process in modern society is the informatization of education. In a broad sense, this involves the effective use and creation (processing) of new information technologies aimed at enhancing the methodology, goals, and psychological-pedagogical implementation of education. Additionally, informatization provides a basis for the development of distance learning systems. New information technologies are extensively applied throughout the educational process.

The necessity of informatization in science is also linked to major changes that create conditions for scientific revolutions. These include the integration and stratification of sciences, as well as the emergence of new fields of scientific knowledge, with life sciences – particularly biology – leading. Modern sciences study complex phenomena and processes of living matter, with increasing accuracy in information obtained.

The informatization of sciences contributes to the improvement of learning activities, integration of knowledge processes based on modern information technologies, and expansion and deepening of scientific fields. This necessitates changes in the selection criteria of educational material. Consequently, the development of informatization leads to changes in content and volume of educational materials, revision of course curricula, and integration of subjects, which, in turn, alters the content and structure of education.

Currently, information methods and tools significantly influence human cognition. Theoretical-informational approaches and computers are increasingly entering human life. Informatics provides a new perspective on reality and serves as a tool for organizing scientific research and applying its results. Traditional scientific reasoning based on abstract concepts and deductive logic is changing. Complex theories can now be directly tested, and their results expressed numerically. Quantitative approaches are expanding across disciplines.

Science now has the capacity to process large amounts of information at high speed. Global information systems, such as the Internet, facilitate the internationalization of scientific activity. Personal computers remove the limitations of scientific work, and formalization methods are applied to process knowledge logically.

Informatics allows researchers to visualize studied objects through diagrams, graphs, and tables, linking abstract concepts with tangible representations. Information technologies formalize scientific knowledge while providing visual representations. They simplify the retrieval of previously acquired information and create conditions for assessing research results and formulating new scientific problems. Computers can even predict research outcomes and outline methods to achieve them, planning the ideal course of investigation.



The value of scientific knowledge depends on the user's level of expertise. Knowledge presented to a school student may be incomprehensible, to a student partially understandable, and to a specialist fully informative. A person's interaction with information depends on their ability to classify, forecast, and work with it.

Informatization in science saves time for collecting necessary information. Without it, a researcher could spend half or more of their working hours gathering data. The complexity of modern research requires the application of information technologies at all stages, both empirical and theoretical. During empirical research, informatics transforms scientific experiments into automated processes for collecting and processing large datasets. During theoretical research, it serves as a tool for testing hypotheses and transforming unstructured data into scientific rules.

Automated information retrieval systems, including logical, mathematical, linguistic, informational, and technical tools, are widely used for entering, processing, storing, and disseminating information. These systems use mathematical methods and algorithms to process experimental results and guide decision-making. The study of complex phenomena necessitates automated processing to achieve accurate results quickly.

Informatization has led to new methods of studying complex systems, such as computational or machine experiments. These experiments rely on information technology to create models of studied objects. Computational experiments involve mathematical modeling, applying mathematical equations to represent the characteristics of objects.

The integration of scientific knowledge through information technology leads not only to the emergence of complex knowledge but also to the unification of various sciences into new fields and disciplines.

In the future, informatization will increasingly impact social life. It provides a basis for synthesizing information science with social sciences, studying information resources, societal information capacity, information flows, and the influence of information on human development and societal structures. This gave rise to social informatics.

## CONCLUSION

Modern e-learning platforms and digital resources, such as online courses and virtual laboratories, are effective tools for improving students' knowledge and expanding opportunities for independent learning. Informatization is also highly important in research activities, as access to scientific articles, electronic databases, and journals enhances research efficiency.

Research results indicate that modern trends and innovative technologies have high potential for improving the quality and effectiveness of education. Therefore, widespread application of informatization, effective use of electronic and digital resources, and professional development of teachers in ICT are crucial.

In summary, the development of informatization in science and education is a key factor in improving modern learning processes, enhancing efficiency, and introducing innovative approaches.

## REFERENCES:

1. A.Choriev. Philosophy of Man. Textbook. Tashkent, 2007.
2. Hamdamov R., Begimkulov U., Tayloqov N. Information Technologies in Education. For Higher Education Institutions. Tashkent, 2010.
3. Yahyo, Muhammad Amin. Protection from internet threats. Supporting tutorial. Tashkent, 2016.
4. Saliev, U., & Salieva, N. (2024). TASKS OF MEDICAL ETHICS AND MEDICAL PEDAGOGICAL DEONTOLOGY. BEST JOURNAL OF INNOVATION IN SCIENCE, RESEARCH AND DEVELOPMENT, 3(5), 456-464.
5. Salieva, N., & Saliev, U. (2021). Women In Medicine-Gender Aspects. The American Journal of Social Science and Education Innovations, 3(05), 292-295.
6. Мадаминов, А. А. (2023). ПОНЯТИЕ ИННОВАЦИОННЫХ ТЕХНОЛОГИЙ, ИХ СУЩНОСТЬ И ФУНКЦИИ. Экономика и социум, (11 (114)-2), 746-749.
7. Мадаминов, А. А. (2019). Политические технологии-важный фактор политических изменений. Проблемы современной науки и образования, (12-2 (145)), 166-170.
8. Туйчиева, О. С. (2021). Методика преподавания латинского языка в медицинских высших учебных заведениях. Молодой ученый, (1), 66-67.
9. Sobirovna, T. O. (2021). Problems of developing student motivation in teaching latin language through medical terminology in medical universities. Academia: an International Multidisciplinary Research Journal, 11(1), 1588-1592.
10. Ахмедова, У. Э. (2018). ТЕРМИНОЛОГИЯ И ЕЁ ИСПОЛЬЗОВАНИЕ В УЧЕБНОМ ПРОЦЕССЕ ПО РУССКОМУ ЯЗЫКУ В МЕДИЦИНСКОМ ВУЗЕ. Актуальные проблемы гуманитарных и естественных наук, (8), 84-86.

11. Ахмедова, У. (2023). DEVELOPMENT OF WRITTEN SPEECH IN MEDICAL STUDENTS IN THE RUSSIAN LANGUAGE CLASSES IN A MEDICAL UNIVERSITY. *European Journal of Interdisciplinary Research and Development*, 16, 308-315.
12. Mastura, J. R. (2022). The use of social forms in improving the effectiveness of the lesson. *Eurasian Journal of Learning and Academic Teaching*, 9, 118-122.
13. Жураева, М. (2025). Lotin tilida tibbiyot ta'limida talabalarni klinik terminlar orqali professional ko'nikmalarini rivojlantirish. *Лингвоспектр*, 1(1), 222-227.
14. Исроилова, С. М. (2023). Использование графических органайзеров в эффективном изучении русского языка. *IQRO*, 2(2), 626-628.
15. Исроилова, С. М. (2024). ФОРМИРОВАНИЕ КОММУНИКАТИВНОЙ КОМПЕТЕНЦИИ СТУДЕНТОВ В ПРОЦЕССЕ ОБУЧЕНИЯ РУССКОМУ ЯЗЫКУ. *Экономика и социум*, (5-2 (120)), 1066-1071.
16. Азимов, У. (2021). Факторы развития аксиологического подхода к демократическим реформам у молодежи в контексте гражданского общества на основе национальных ценностей. *Общество и инновации*, 2(8/S), 296-302.
17. Azimov, U. B. (2023). YOSHLARNING DEMOKRATIK ISLOHOTLARGA AKSIOLOGIK MUNOSABATINI RIVOJLANTIRISHNING NAZARIY-METODOLOGIK ASOSLARI TAHLILI. *Farg'ona davlat universiteti*, (1), 195-195.
18. Mamatxonova, M. (2024). TRADITION AND INNOVATION IN THE WORKS OF OMON MUKHTOR. *Spanish Journal of Innovation and Integrity*, 26(1), 167-173.
19. Mamatkhonova, M. (2025). THE RELEVANCE OF USING INNOVATIVE TECHNOLOGIES IN UZBEK LANGUAGE LESSONS. *Journal of Science, Research and Teaching*, 4(8), 1-5.
20. Karimovna, M. O. (2021). Structural properties of additional elements. *Asian Journal Of Multidimensional Research*, 10(5), 173-178.
21. Karimovna, M. O. (2022). Linguocultural features of phraseology in Uzbek and German languages. *Galaxy International Interdisciplinary Research Journal*, 10(6), 481-482.
22. Abdurahimova, M. (2025). SUKUT PSIXOFIZIOLOGIYASI. *Scientific journal of the Fergana State University*, (1), 72-72.
23. Qayumov, A., & Abdurahimova, M. (2024). QO 'CHQOR NORQOBIL QISSALARIDA PSIXOLOGIK TASVIR VA PSIXOFIZIOLOGIK HOLAT MASALASI. *Farg'ona davlat universiteti*, (3), 529-529.
24. Ганиев, М. М. (2021). Роль иллюстративно-объяснительного обучения русскому языку иностранных студентов. *Молодой ученый*, (1), 53-55.
25. Ганиев, М. М. (2022). Русский язык–язык межнационального общения. *INTEGRATION OF SCIENCE, EDUCATION AND PRACTICE. SCIENTIFIC-METHODICAL JOURNAL*, 3(9), 103-106.
26. Anvarov, A. (2025). THE ROLE OF REVERSIBLE EDUCATION IN THE DEVELOPMENT OF PROFESSIONAL EDUCATIONAL COMPETENCIES OF STUDENTS OF MEDICAL EDUCATION. *Журнал академических исследований нового Узбекистана*, 2(6, 2-qism), 135-138.

27. Anvarov, A. (2024). THE PROCESS OF TEACHING A FOREIGN LANGUAGE IN ADDITION TO COMBINING THE KNOWLEDGE OF SUBJECT ON THE BASIS OF COMMUNICATION. *Best Journal of Innovation in Science, Research and Development*, 3(1), 389-395.

28. Yusupaliyevna, H. S. (2024). MODEL AND TECHNOLOGY FOR THE DEVELOPMENT OF PROFESSIONAL ABILITIES OF STUDENTS IN MEDICAL EDUCATION. *INNOVATIVE DEVELOPMENTS AND RESEARCH IN EDUCATION*, 3(28), 399-403.

29. Хамдамова, Ш. (2024). Возможности дидактики в профориентационном обучении английскому языку студентов медицинских специальностей. *Общество и инновации*, 5(4/S), 286-290.

30. Ergasheva, S. (2019). CRITERIA FOR THE EDUCATIONAL PROCESS IN FORMATION OF COMMUNICATIVE COMPETENCE OF FUTURE MEDICAL PERSONNEL. *European Journal of Research and Reflection in Educational Sciences Vol*, 7(12).

31. Pulatovna, E. S. (2021). Pedagogical conditions for the formation of communicative competence of students of medical higher education in the process of preparation. *Academicia: An International Multidisciplinary Research Journal*, 11(1), 1596-1602.

32. Каримова, М. (2025). Развитие профессиональных навыков через аутентичную компетенцию. *Общество и инновации*, 6(1/S), 217-221.

33. Karimova, M. (2022). BESONDERHEITEN DES FREMDSPRACHLERNENS AN EINER MEDIZINISCHEN HOCHSCHULE WÄHREND DER COVID-19-PANDEMIE. *Архив научных исследований*, 2(1).

34. Karimov, A., & Muxammadjonov, X. (2020). Information technologies: Information education and informatics. *Экономика и социум*, (8 (75)), 40-43.

35. Akbarov, D., Umarov, S., Abdurakhmonova, M., Nurmatova, I., Karimova, G., & Karimov, U. (2025, October). Application of logical operations and table replacements in basic transformations of hash function algorithms. In *AIP Conference Proceedings* (Vol. 3377, No. 1, p. 060002). AIP Publishing LLC.

36. Abdurakhmonova, M. M., ugliMirzayev, M. A., Karimov, U. U., & Karimova, G. Y. (2021). Information culture and ethical education in the globalization century. *The American Journal of Social Science and Education Innovations*, 3(03), 384-388.

37. Djurayevna, M. M. (2023). The Impact of Non-linguistic Elements on Phonostylistic Changes. *American Journal of Research in Humanities and Social Sciences*, 18, 153-157.

38. Мадумарова, М. Д. (2018). Рекомендации по внедрению активных методов в учебный процесс. *Вопросы науки и образования*, (2 (14)), 53-55.

39. Хасанов, И. М. (2020). Сущность и функции домашних хозяйств в современной экономической системе. *Образование и наука в России и за рубежом*, (3), 65-67.

40. Hasanov, I. M. (2022). OILAVIY TADBIRKORLIKNI RIVOJLANTIRISH MASALALARI. *Research Focus*, 1(1), 273-276.