

# INFORMATION TECHNOLOGIES IN EDUCATION: FORMATION OF A CONTENT COMPONENT

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## ABSTRACT

**The object of research:** modern trends in the transformation of education.

The transition to the paradigm of knowledge was largely ensured by their universal computerization. This led to an understanding of the need to develop new approaches in educational activities based on the use of modern information technologies.

Investigated problem: taking into account the advantages of the content component in educational activities.

**The teaching technology** is built on the foundation of certain content, therefore, it is relevant to consider the content component in the context of the openness of education. If the concept of openness in education is based on the developments of fundamental education, introducing new qualities into it that correspond to the actual needs of the individual, then its content component presupposes an emphasis, first of all, on economic problems and ways of solving them.

**Main scientific results:** Existing databases contain mainly structured information, but a significant amount of them is unstructured. Joint analysis of data from various sources is possible only on condition that unstructured data will be structured, since only for the latter the mathematical apparatus of data processing is most developed.

To train a professional who can competently work with data, able to combine mathematical logic with the ambiguity of interpretations and concepts in economics and, accordingly, methods of obtaining data based on the purpose of the study is the task of specialties in economics. Information technology and the creation of common platforms for open education are the instrument for solving this problem.

**The area of practical use of the research results:** the problem in training specialists of this profile is the ability to assess the accuracy of the initial information and the accumulation of errors during its processing.

**An innovative technological product:** the relationship of mathematics and statistics in the curriculum for training business analysts creates a platform, the use of which makes it possible to solve the issue of a balanced approach to the accumulation and processing of data, taking into account the desired results in a particular subject area.

**Scope of application of an innovative technological product:** only a competent internal policy of universities on the use of information technologies in teaching provides sufficient technical support in the relationship "student – teacher" aimed at complementing classical education technologies.

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## 1. Introduction

A distinctive feature of modern society is the dynamism of its development, uncertainty and instability of the processes taking place in it. The existing transformation of post-industrial society is determined by information – a unique resource for obtaining knowledge created by a person

in the process of its activities. The redistribution of access to information, as the most important component of the interaction of all processes of social, economic and political activity of a person, determines both the method of government and business, and the method of obtaining knowledge.

Education is a reflection of the changes taking place in society. The beginning of the new millennium brought fundamental changes not only in the understanding of the goals and objectives of education, but also in the methods used to achieve them.

Innovative processes taking place in society require a person to have high professional competence, which is necessary for the development of new technologies. The consequence of this is an increased attention to the level of intellectual development of the individual, to the ability to learn throughout life.

Universal computerization has determined the need to develop new approaches in the field of educational services, which should be based on knowledge, communication skills associated with a person's ability to self-development in conditions of constant updating of information [1].

The new model for the development of a society based on knowledge considers openness as a basic characteristic of modern education, and the development and widespread introduction of open education technologies as an urgent problem of the new millennium.

Studying the problem of openness in education, UNESCO focuses on:

- providing each individual with its own vision of the process of its education;
- prerogative of the development of systems thinking in the learning process;
- rational organization of the cognitive activity of students, which allows individualizing the educational process;
- consideration of information and communication technologies as a tool to ensure the main function of the learning process;
- improving the system of distance learning at various levels [2].

Therefore, the issues of openness of education, considered through personal improvement based on the combination of theoretical and practical knowledge and skills, determined the relevance of choosing a research topic, taking into account the time factor.

### **1. 1. The object of research**

The object of research is the current trends in the transformation of education.

### **1. 2. Problem description**

The growing role of information and communications in the formation of human capital as an information product, identified the problems of informatization and practical implementation of information and communication technologies in education [3–8].

In modern society, an integral part of people's lives is associated with digital technologies.

The intuitive users of these technologies are schoolchildren and students who have already been born in the digital world. Therefore, the use of these technologies in education is a prerequisite for its development. On the one hand, the use of technologies has simplified the solution of the issues of the formation of databases and their storage, and on the other hand, it minimizes communications and does not guarantee the possibility of making correct decisions when using them. Therefore, it is important to meaningfully use these technologies in education [5–9].

To support the processes of educational innovation and add value to the body of knowledge is the task of open education [6, 8]. Whereas, organizing the learning process so that all its participants interact with each other is a matter of modern interactive pedagogical learning technologies [10].

### **1. 3. Proposed solution to the problem**

The formation of a constructive methodological approach is a necessary condition for achieving the effectiveness of the education sector in the context of the formation of new trends and patterns of economic development, the spread of information and communication technologies. This approach should ensure the complexity and subsequent effectiveness of the practical implementation of educational services.

**The aim of the article is** to determine the general scheme of the formation of the educational process, taking into account the content component as a basic condition for improving education at the present stage of the development of society.

## 2. Presentation of the basic material of the research

The need for continuous human interaction with the surrounding reality, the actualization of society, the exchange of information flows, the integration of all forms of knowledge acquisition have determined the special attitude of modern society to education as a basic resource where a person is able to impart synergistic qualities to the education process.

The strategy for the development of the educational sphere today is largely determined by the Concept of Open Education. The main goal of the openness of education is the development and implementation of open educational resources that contribute to both the disclosure of the student's capabilities and the flexibility of the educational process, adapted to modern market requirements. The instrument for achieving this goal is innovative technologies, including information technologies [11].

Consideration of learning and cognition not as a state, but as a process, determined the creation of common platforms of open education. Popular online course platforms MOOC (Coursera, EdX, Udacity) and MIT OpenCourseWare (MIT OCW) are now providing massively interactive learning using e-learning technologies.

The qualitatively new role of education presupposes the combination of the previously developed fundamentality and the provision of the quality of education at the world level, which can be really applied to resolve specific socio-economic problems [12].

A comparative analysis of the concepts of traditional and open education allows to identify a new vision of educational work and highlight the qualitative changes in the pedagogical system (**Fig. 1**).

The presented characteristic defines a new approach to the content component of education, which, on the one hand, should be aimed at solving specific professional problems and considering the student as a full-fledged subject of activity in solving various types of problems, on the other hand, focusing on the creative component of the educational process.

At the present stage of development of society, information is one of the main competitive advantages of the development of the world economy. Based on this, the requirements for the training of specialists are increasing, who are able to both collect the necessary information for a specific socio-economic problem, and who know the methodology for calculating indicators, ways to verify the results obtained [13, 14].

Hence, the professional level of economic training should be built on a clear interpretation of economic categories and concepts, an understanding of the advisability of choosing the most adequate theoretical model for solving the problem based on the stated aim of research.

The specifics of economic theory are determined by the methods of checking the correctness of economic measurements. Today, a significant part of business process data does not conform to the format of structured databases and can be stored in a large number of different storages. This defines the problem of their economic analysis.

A unique potential for the extraction of new knowledge is unstructured information, which is ambiguous, diverse and tends to change its structure and meaning.

Thus, the use of both structured and unstructured data allows cross-analysis of the impact of various factors on a specific economic situation and, in the future, influence the validity of decisions.

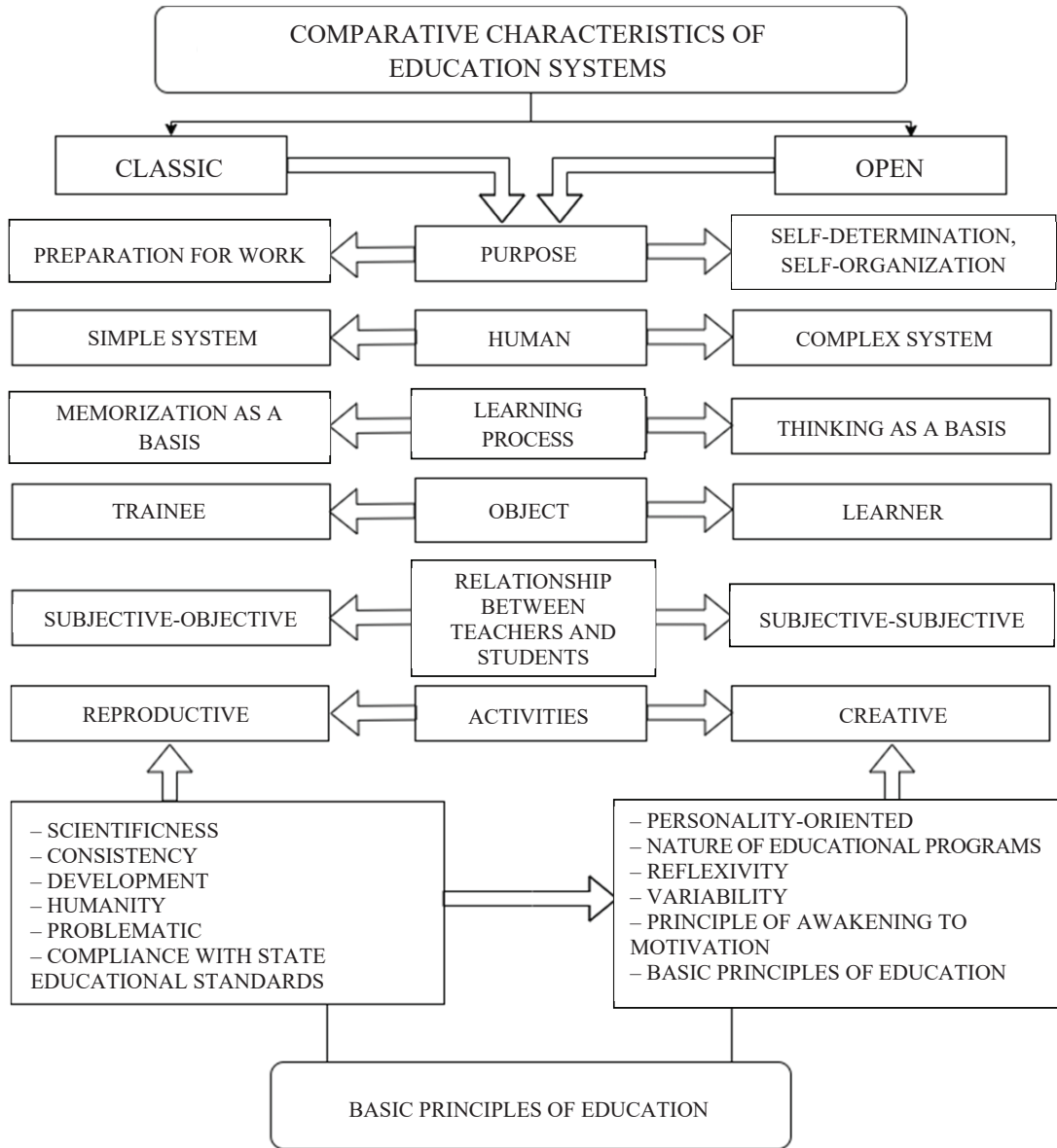
However, the lack of a comprehensive understanding of the sources of the formation of the area of analysis of structured and unstructured data, as well as an available tool for describing schemes and rules for analyzing these data, although it forms a new phenomenon in their analytical processing, does not allow assessing the volume and quality of hidden information.

In the current data flow, the main challenge is finding business-relevant information in real time and presenting it in a meaningful way. There should be enough information so that it can be turned into knowledge [15, 16].

However, a large amount of data does not characterize the accuracy of the final model. For the final result, the consistency of the data updates rate and the time interval required for this is relevant. This makes it possible to find quantitative relationships between economic variables.

Consideration of the provisions considered above is based on the fact that most of the settlement operations are associated with a certain mathematical program, the main requirement of

which is that all economic problems can be solved following a certain sequence. At the same time, it should be borne in mind that the transition from a traditional education system to an open one is aimed more at the correlation dependence between the variables of the model than at reflecting the cause-and-effect relationships that underlie the classical education system. This defines a new level of mathematical training for students of economic specialties.

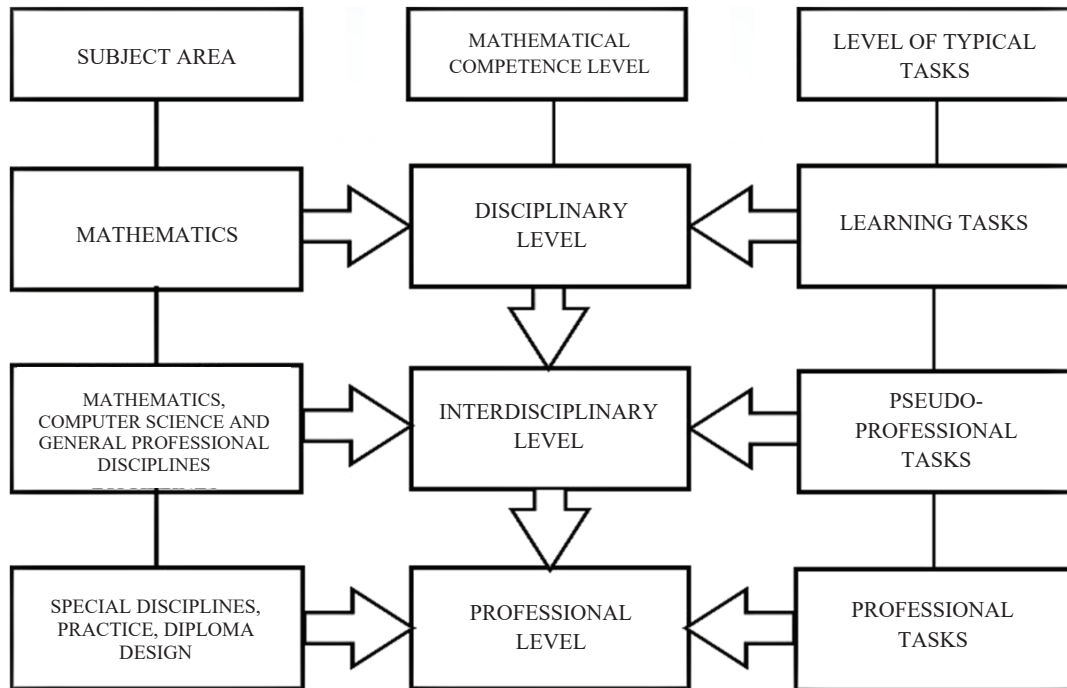


**Fig. 1.** Comparative characteristics of education systems and the principles that determine it. Developed based on [5, 12]

From the point of view of the mathematical competence of a specialist, it becomes important to understand the unique options for the possibilities of different tools for the implementation of different ways of solving and different forms of obtaining results when solving economic problems (Fig. 2).

The professional level of economic decisions is based on a real business process. The foundations of the logic of thinking, tracking the presence of connections between the factors that form an economic problem and the subsequent application of mathematical methods and models for solving applied problems, are determined by mathematics.

Hence, the mathematical competence of a specialist lies in understanding the varied capabilities of various tools for the implementation of various solutions and forms of obtaining results [17].



**Fig. 2.** The place of the mathematical component in the content component of education

But, in real business practice, the availability of access to a large amount of data, their constant updating and increase against the background of the lack of tools that allow establishing the relationship between these data, determines the need for the development of specialized methods of their analytical processing.

If the professionalism of a specialist is considered through its understanding of the criteria that determine the choice of the most adequate theoretical research model, namely [7]:

- identifying logical contradictions,
- minimizing the number of initial hypotheses and testing them on mass populations,
- mathematical rigor of theoretical concepts and the validity of the initial premises of the theory,
- reproducibility of results on a large number of objects, then a tool, technology, application, as well as a method of collecting, analyzing and presenting data to create a functional system for their processing is business analytics.

The modern importance of business intelligence today boils down to understanding the importance of data and its analysis, the ability to understand the processes and tools necessary for effective information processing.

Database features pose big challenges for data analysis and motivate the development of new statistical methods. IT technologies and work with alternative data sources are able to solve the age-old statistical problem of the ratio of data speed and quality, but at the same time, timely extraction of useful information and, accordingly, making correct conclusions based on them is hampered by the presence of a large number of different programs and systems.

Business intelligence tools are software applications that perform tasks for monitoring, collecting and analyzing data, and also allow to track the patterns of dynamics, structure, distribution and relationships in this data.

Knowledge of statistics and methods of its analysis as a basis for improving business intelligence determines that data processing techniques have limited opportunities to obtain reliable results if these data have systematic errors. If data is only important for choosing between theories, then the data processing process will focus on making informed decisions. This will make it possible to build models for each client, as well as customize and rebuild them in real time.

Thus, the relationship between educational programs in mathematics and statistics contributes to the formation of a creative specialist who understands the clear line between the theory of the issue and the rules for calculating indicators. The competitive advantage of such a specialist is

the ability to extract the hidden parameter from the available data set and estimate the value of this parameter in a more reliable way.

Based on the fact that the main function of the learning process and its support is provided by information and communication technologies for the transfer of educational information, systems that ensure the concentration of educational materials and course management issues are of interest.

A personal training system allows to automate the management of the course. The feasibility of using such a system in the form of electronic courses of the Moodle learning management information system makes it possible to link such basic means of communication as e-mail, forums and chats [18].

One of the basic concepts in the Moodle information environment is the concept of a course as a means for presenting educational material, organizing the learning process and an environment for network communication of course participants.

The functionality of the software platform is determined by its communication block, which provides feedback when using the theoretical, practical, independent and control components of the electronic course.

Based on the increase in the volume of communication in social networks, it is useful to ensure the educational process that students connect their accounts with Telegram bot to receive a flexible notification system for the purpose of communication “teacher – student”. Improvement of the communication component makes it possible to ensure the combination of the variable and situational content of the information and cognitive competence of the student for the sake of the formation of a creative specialist – a professional.

### **3. Discussion**

The foundation of training specialists of any profile is the structural and logical sequence of teaching mathematics and statistics. But, misunderstanding of the essence of the studied phenomena and processes, false correlations and confusing cause-and-effect relationships lead to the construction of models that are flawless from the standpoint of mathematics and are completely unviable in reality.

IT acts as a tool that helps to reflect both the essence of the problem and the possibility of its implementation within the required time interval.

The increase in the number of data sources worsens the human perception of the results of the analysis of the data obtained. In this case, IT reduces the individual approach to the educational process and the level of student control [19].

When training specialists in the economic field, the priority is to understand the essence of the economic problem and the selection of tools that allow it to be solved quickly.

Thus, the competencies obtained in the study of mathematics - economics - statistics, form a meaningful component of the educational process. At what stage and how IT should be used depends only on the problem facing the business.

The ideal tool for solving business problems, decomposing it into simple components and obtaining the best solution is business analytics.

Training business analysts who understand statistics will allow to combine understanding of the business process with modern BIG DATA software shells and GOOGLE ANALYTICS tools.

### **4. Conclusion**

The ongoing changes in modern society determine new features of education, among which an important characteristic is openness.

A knowledge-based society defines information as the basis for its development. A paradoxical situation arises - there are powerful tools for storing and analyzing large amounts of data, but decisions based on the results of this processing must be made by a person, since it has the ability to generate new information.

The specificity of economic development is associated with methods for assessing the error of economic measurements. Therefore, the training of specialists who can competently work with data and use modern tools for their processing will create an educational environment where it is possible to assess the importance of the interaction of technology in the education system [20].

Paying attention to the tool for the implementation of new educational models, it is necessary not to forget about the content component of those training programs that this technology serves. It is necessary to ensure not so much interactive work with data as the efficiency of access to them. The presence of a logical-structural scheme for teaching mathematics and statistics will allow the formation of a creative-thinking specialist who is able to combine different methods of data analysis to make informed decisions.

To obtain the desired results, it is necessary to properly organize the process itself. The optimal combination of the content component in the training of specialists with technical support is achieved using one of the popular learning management systems Moodle, when the support of basic learning technologies does not contradict the actual implementation of changes in the educational institution.

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