








Information and Communication Technologies as a Phenomenon and Its Impact on Goals and Quality of Education

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Abstract. One of the most important factors for improving the quality of education and the successful achievement of modern educational results is the use of innovative forms and means of education in the educational process. The work notes that fundamentally new educational results, relevant to the needs of the modern education system, can be achieved only by new educational activities and support of new types of educational activities of subjects of education. Interaction of subjects of education in information and educational environment is a feature of contemporary training processes.

Being a social and cultural phenomenon, Internet-, Web-, Smart- technologies as a result of the development of information and communication technology, are becoming increasingly significant in modern information society changes, have a huge impact on the formation and development of the information and educational space. In this regard, the article deals with qualitative changes in education in the information society under the influence of modern information and communication technologies, media technologies, SMART technologies.

The phenomenon of media culture (personal media culture of a subject of education) is relatively new for the analysis of cultural aspects of the information society in the information digital era and the range of discussion issues goes well beyond this paper. However, it should be emphasized that the influence of media culture leads to the formation of a particular type of mass consciousness in society - mass media consciousness. In this perspective, the issues of the formation of modern media culture, the awareness of which will help to preserve humanistic ideals in the age of digital technology, are outlined. All these circumstances encouraged the authors to express their opinion in this paper and discuss issues related to the expansion of educational opportunities and the didactic potential of information technologies and the degree of their impact on goals and quality of education, educational activities of subjects of education.

Keywords: Media environment · Communication · Social culture · SMART-education

1 Introduction

In the modern understanding, education is a teaching process and its results, where the process involves educating and development of an individual, his instruction and parenting. That is, education is the transfer, assimilation and personal “adoption” of experience, knowledge, skills, culture of previous generations by a new generation for its subsequent use and expansion in accordance with the goals of society and its development requirements. In this regard, the following *educational goals* can be identified:

- maintenance of the continuity of the society reproduction in its new subjects formed in the education system and the objects of the social environment;
- historical security of the society – continuous existence and development: the resources and knowledge of society lose their value without being acquired by new generation;
- the formation of an individual who is capable and directed at solving socially significant issues and problems;
- the formation of a harmoniously developed personality, capable of perceiving and developing social culture, intellectual and spiritual values of society;
- formation of the subject’s ability to adapt to changing environmental conditions, to orient in the sphere of social, economic, scientific, educational, industrial and other relations.

Education is in the stage of updating and the development of content and methodology, conditioned by the objective grounds:

- Change of epochs and social economic structure, resulting in change of conditions and priorities, change of culture, worldview.
- Change in the state of the subject of education under the influence of the environment, the general social cultural and scientific and educational development of modern society.
- Changing the environment under the influence of global informatization, which has become the medium of the postindustrial society.
- Changing the content and methodology of education in accordance with changing its conditions.

Along with the growing need for continuous education, there is a growing trend towards the formation of *international educational systems* of various types and various goals. There is a process of internationalization of education, not only in content, but also in teaching methods and organizational forms.

2 Problem Statement

In the information-digital era, information and pedagogical technologies are being integrated into education, which enables the adaptation and formation of the educational process of the student. In particular, UNESCO [1] documents state that *digital pedagogy* [2] (we would call it instrumental didactics) is becoming the key to effective and efficient use of ICT, involving critical use of electronic components and open educational resources [3] in order to improve the efficiency of education and achieve the proper quality of learning results.

In particular, the UNESCO document notes that the key to effective and efficient use of ICT is becoming a digital pedagogy, which implies the critical use of electronic components and to improve the efficiency of education and achieve quality learning outcomes.

Naturally, the task becomes complex and difficult and at the same time extremely relevant. It becomes the subject of discussions [4–11].

There is a need to study the degree of influence of ICT on goals and quality of education, the formation of the personal culture of the student and problems of media education, media competence and media culture of subjects of education.

3 Research Issue

The topic of the discussion is the process of integration of information and pedagogical technologies, the practice of implementation and development of digital pedagogy in education. The problem is the definition and differentiation of sources and the degree of influence of IT-technologies on the goals and quality of education.

There are also *significant issues* on the characteristic feature of the information society “*social culture, information culture*”. A complex, system-based formation of the information culture of subjects of education is required. It has not been formulated (as a social and educational factor) in the system of information education and it has not been maintained by the content and means of teaching computer science.

4 Research Questions

Educational resources, information, electronic educational resources (EER) should be viewed from the standpoint of *informatization of education* as a purposeful and specific projection of the informatization of society on the education sector. First of all, it is necessary to:

1. Consider information educational resources (IER) in an integrated relationship, systematized; to classify them according to uniformity and specification.
2. Describe information educational resources as products of creative labor, information products in the aspect of its production and consumption, in the aspect of separation of information and pedagogical work, in the aspect of information rights, duties, responsibilities.
3. Determine the place of IER as an integrated information and educational resource in the system of information education.

5 Research Methods

The following *methodological approaches* are used: systemic, informational, sociocultural, personal, ontological.

6 Findings

Education becomes an instrument of interpenetration not only of knowledge and technology, but also of capital, an instrument for competition for the market, solving geopolitical tasks. This is the result and inevitable consequence of the introduction and implementation of a system information approach in the field of education. This is the development of the “*ontological dimension of education*” [12].

Informatization of society (the world community) has become a global phenomenon, changing the way of life, culture and world vision of peoples, science and manufacture, reflected in the nature of relationships, communication and interaction, in social norms and law. Global information exchange and interaction in a unified information environment, formed under the influence of information, create favorable conditions for the development of integration processes. Inter-system interaction is supplemented by the interaction of national information systems.

Informatization in the social (sociocultural) aspect is an objective factor in the development of society and its social and information environment, caused by the rapid development of the scientific and cognitive sphere, computer science and its applied field, computerization. It is focused on the development of society, its resources and productive forces, the nature of its activities, culture. It is oriented towards informatization (in its objective and fundamental meaning) of cognition processes and is itself being implemented in these processes.

The consequence of informatization in the social aspect is not only a change in production, but also *social cultural relations*. A new stage in the development of society and the whole of civilization, a new stage in the development of culture - the *information culture* has started.

Social and cultural informatization is a complex of naturally interrelated subjects and objects, processes and relationships, i.e. an open and evolving social and information system. This system is an objective factor of the social environment, developed in accordance with its conditions and itself significantly modifying these conditions.

Therefore, the informatization of education is not only the informatization of the educational environment and the educational infrastructure, but also, first of all, the solution of all problems of information cognitive activities, information interaction of subjects of education, which implies its penetration into all pores of the educational process and the sphere it forms.

The following definition has special significance for the suggested research:

Informatization is a “systemic activity process of acquiring information as a resource of management and development with the help of computer science tools with the goal of creating an information society and on this basis” maintaining the progress of civilization”, [13].

Following this definition, informatization of education can be understood as a universal means of its *modernization*, development, improvement with the goal of transforming it into a state corresponding to the *information society*. This level of education is often called *noospheric*.

As a consequence, the *quality of education is determined by the degree of its relevance to the information society*. Due to the fact that, like any other correspondence, it involves the implementation of direct and inverse links, it should be considered in the following aspects:

- Education should inherit the characteristic features of the information society and, firstly, in regard to knowledge and cognition, as its determining properties, its social culture, as well as its resource and technological equipment and infrastructure.
- Education must meet the requirements of the development of the information society, go slightly ahead and, developing itself, develop society.
- That is, the information society and its formation are mutually defined and mutually express each other:
- The Information Society is a scientific, technological and socio-cultural base that ensures the noospheric development of education.
- Education predetermines the state of society as an information society and develops it during its own development.

The information sphere of the society is not only the informatization industry, it is also the social-information interaction in which all information processes are fulfilled. Optimization of this sphere involves availability not only of a system of legal norms and the corresponding organization, but also of a high level of *information culture* of subjects of interaction, including their legal culture.

The culture of the information society is determined by its information worldview, the level of intellectual development, knowledge and technology; spiritual culture - information morality, the state of the humanitarian sphere.

It is the high level of the information and legal culture of the society and its subjects that characterizes the state of society as an information society. This is not only another formation, but also a *new level of civilization*. “The concept of the information society reflects, in our opinion, not a formational, but a civilizational aspect of social development, [14]. We still aspire to this level, the society aspires, therefore, education aspires.

The information society with the accelerating growth of knowledge and technology change, has received the most important task of generational change, educating people able to perceive the experience and knowledge of mankind, provide further development. The higher the level of informatization, the greater the investment of resources, intellectual forces, knowledge into the education system.

The Information Society requires a comprehensive, systemically interconnected subject teaching, a logically complete information education.

Education must become qualitatively different:

Firstly, modern education should be *continuous*, providing for the possibility of continuing education and self-education “of the individual throughout the economically active life, synchronized with production tasks and changing in the course of life by the

needs of the individual in self-development, [15]. The main result of general education (secondary and higher) is the development of the individual, the ability of a person to self-education and self-instruction.

Secondly, the requirement for the continuity of human education means that it is not the specific knowledge and skills (they can quickly become obsolete in the developing information environment), in the forefront, but super-subject, general scientific knowledge, general educational skills and competencies, knowledge of universal methods of activities and the ability to implement them. Therefore, general education, especially higher education, should become *universal*, while remaining specialized, and therefore fundamental. It must provide a person not only with opportunities for adaptation in a wide range of activities, but also, if necessary, the ability to work in the related field of personal activity, professional development, retraining.

Global informatization itself poses many problems for society, which together with its development also become global and difficult to solve. They are problems of information and legal culture, regulation of information relationships on the principles of law and universal morality, the problem of information security and its provision. A declaration of the right, along with a control system and appropriate repressive measures to solve these problems is insufficient.

The development of the informatization industry entails an increase in the role of automated intellectual systems, artificial intelligence systems with bases of formal knowledge. There is a convergence of natural and artificial intelligence knowledge, which has both positive and negative impact (elements of technological development and robotization of thinking).

The information society is characterized not only as a *knowledge society*, but primarily as a cognition society, where “the labor processes are merged into a single whole, new knowledge is obtained for solving production problems and generating new knowledge, ... the cognitive activity of man becomes the determining factor of development. ... Personality becomes the bearer of a unique “set” of knowledge, skills and abilities”, [15].

This statement leads to the conclusion that knowledge is not only a starting point, a means and a product of cognition, but also the object of production in the industry of the society (information and general). Therefore, cognition appears as an integrated process of *consumption of knowledge* (as a result of its acquisition, assimilation) and the *knowledge production* (in the processes of research, processing in artificial intelligence systems). This increases the social significance of knowledge and cognition as social phenomena.

Since the main characteristic of the information society is “knowledge”, then the corresponding education should inherit this property, specifically express it in its quality. Knowledge is the main and most important resource of education, a means of its development. But the main task of education is not the production, but the reproduction of knowledge in personal systems, in the efficient and rational transfer of knowledge and its absorption and “appropriation” of the recipients of this transfer.

Consequently, the quality of education is determined by the *quality of its cognition by the subjects*:

- Cognition of the world, nature, society, methods and means of this knowledge.
- Cognition of man as an element of the world and a member of society.

- Self-knowledge of man as a subject, individual, personality in the context of his socialization.

The information society with the accelerating growth of knowledge and technology change, has received the most important task of generational change, educating people able to perceive the experience and knowledge of mankind, provide further development. The higher the level of informatization, the greater the investment of resources, intellectual forces, knowledge into the education system.

Another important characteristic of the information society, without which the society does not exist, is “social culture”, expressed in personal culture, information culture, in the personal development of its subjects. Consequently, the quality of education is also expressed by this characteristic. It manifests itself in the results of the formation and development of personal culture, information culture, as well as the personal *culture of knowledge and culture of cognition* as expressions of integrated quality combined with the characteristics of “knowledge”, “cognition”, “socioculture”.

The information society and the corresponding noospheric education are also characterized by a high level of development of information and communication technologies or information and communication technologies, since these two characteristics of technologies form a coherent logical whole in it. An *information educational environment* (EEE) is gaining an increasingly important role in education, where information, including electronic educational resources of open access and technologies that provide this access, as well as its organization and management are concentrated. This is an expansion of educational interaction up to information and educational interaction through communication technologies.

The main objective of the information educational environment is its positive impact on education and subjects of education, the result of which should be their compliance with the state and requirements of the information society. That is, the goals of education are inherited by its information educational environment and are achieved in an indirect way.

Modern information cognitive environment mostly includes *media technologies* and electronic media resources, as well as means of their reproduction, display, and perception support. All together they create a *media environment* for society and education. As a result, media education and media education, media competence and media culture of its subjects have become qualitative signs of noospheric education.

Media education is the formation of media competence and personal media culture. Media education includes media teaching and education through media environment on the basis of media competence and media culture of subjects received in media education. In fact, media education is a new form, a media level of education.

Products of the new technological wave on the basis of nano, cyber and other innovative technologies have become Smart technologies, Smart devices, Smart resources integrated in *Smart systems*, [16–20]. These systems are based on “smart” devices with their own built-in artificial intelligence, which transform interaction in the media environment into an intellectual one. They “smart” devices with their own built-in artificial intelligence, transforming the interaction in the media space.

That is, Smart-environment, generated by these “smart” devices and systems, is a Smart-representation of the media environment. Smart technologies allow “to use an individual training schedule, to maintain a constant contact of the student with the teacher, to achieve a lasting assimilation of knowledge,” [18].

Smart-systems have had such a significant impact on society and education that the terms “Smart-society” and “Smart-education” came into use, meaning their new types, new quality levels. However, this is not quite true: it is just an expression of the qualitative level of technology in society and in education, but not their expression. The society remained informational, education - corresponding, in its new development state. That is, SMART-education is a state of *media education*, and an educational SMART-resource is a kind of media electronic-educational resource.

Smart-technologies and Smart-systems determine the opportunities for the transition of the educational and training process to a new quality, but they themselves do not create this transition. They only contribute to the acquisition of new qualities by education, as well as by society.

Even the best and highest level information and communication technologies, media technologies, Smart technologies are just a “quantity” that can “turn to quality”, or rather, with the appropriate growth and perfection create the opportunity to transition to a new quality. This, of course, does not attribute lesser importance for education and its media environment, as well as their impact on the personal development of subjects of education.

7 Conclusion

Thus, a qualitative expression of the impact of information and communication technologies on education is:

- Information content, media content of education.
- A relatively large personal orientation, an orientation toward the socialization of the subject of education as a person, as a subject of the informative cognitive social cultural environment, the development of personal information culture.
- Focus on self-organization, self-management of the subject in information and educational interaction, self-development.

SMART-education allows expanding opportunities for the development of personality in solving these problems in the changing world. It forms the creative potential of the future specialist, so vital in modern conditions [17, p. 21].

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