

# Digital Modelling of Educational Content in the Professional Training for Mining Industry

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**Abstract.** The creation of high-quality educational content is a necessary condition for obtaining professional education and training in mining. The article examines the relevance of modeling and refining the components of educational content in solving the problems of training highly qualified personnel. The role of MOOCs (Massive Open Online Courses, or MOOC – Massive Open Online Courses) in the system of professional education is considered for mining training. Theoretical analysis thesaurus phenomenon of digital culture, the definition of the concept of digital culture, identified the principles of its creation and functioning. The influence of digital technologies on culture, innovations and traditions in public structures is investigated. Digital culture and digital transformation of society, creating an artificial environment, carries out the transfer of socio-cultural objects into virtual reality. Social changes in connection with the emergence of digital technologies and processes in mining education are analyzed.

## 1 Introduction

Culture as a phenomenon surrounds us everywhere, creating an artificial environment in which a person exists: these are architectural objects, household items, art paintings, sculptures – all this and much more creates a cultural environment. Mining industry development also comprises the trends of digitalization – virtual mines and mineral processing plants have been appeared in recent years. Mining education is not an exception – mining schools and universities introduce digital teaching technologies very actively. Therefore, we can speak about special part of mining – mining education culture.

Digital culture is not about digitizing and transferring cultural objects into virtual reality. This is a phenomenon of human society based on global changes in interaction, communications and technologies of human life. Digitalization began to have a significant impact on culture due to the emergence of the Internet as a mass form of communication and the widespread use of personal computers and other digital devices, such as, for example, smartphones, which led to the formation of the phenomenon of digital culture. Digital technologies have penetrated so much into human life that the study of digital culture potentially covers all aspects of everyday life and is not limited to the Internet or modern communication technologies. [1].

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The concept of digital culture is viewed as an ideology of management and functioning of socio-economic systems based on the penetration and joint use of digital technologies: in intrasystem processes and in the interaction of the system with the external environment.

The concept of digital culture includes norms, rules, traditions, methods and forms of communication and decision-making. The central core of digital culture is a system of values that characterize how an organization (system) promotes and supports the use of digital technologies in the process of its functioning with the aim of the greatest efficiency.

## 2 Materials and Methods

There are many interpretations of the concept of digital cultures. Influence on the culture of the media environment and digitalization. Digital culture emerged simultaneously with new media technologies [2]. Post-Internet society, united by means of mobile devices and computer networks through time and space [3]. A term to describe the changing relationship between the ways of creating and consuming culture and how new information technology affects these changing relationships [4]. A new form of culture that is being shaped by digitalization. "Digital" in the term reflects the use of electronic systems that store, process and transmit digital speech encoded as a digital sequence [5]. Values, agreements, thoughts in modern society, as well as how people communicate within this society [6]. A term for representing a clear and almost complete transformation of the world with the help of digital technologies. Used in various issues, hacking to independent music and the economy of solidarity [7].

Digital culture reflects the stage of development of the cultural phenomenon of society in the 21st century, based on digital communication technologies and digital social networks, digital images and visualization, virtualization of space and the material world, the formation of a value system based on digital and information technologies and systems.

Digital culture is a socio-ethical system that reflects the ideology of the information age, which includes the following main structural components:

1. Knowledge (information, BigData, etc.).
2. System of internal and external communications based on digital and information technologies.
3. Culture of intra-organizational processes: organization of business processes (digital production systems, production organizational systems, etc.), decision making.
4. A set of interrelated social, economic, technical, scientific values based on digital and information technologies [4].

The ideology of a digital society is a system of views, ideas related to the existence, functioning, development of society, management of socio-economic systems, development strategies, ways and methods of achieving goals, with business ethics and social responsibility.

The ideology of a digital society is based on a change in relations and the role of digital technologies, the organization of intrasystem processes and the nature of the interaction of systems with the external environment.

The ideology of digital culture is manifested in the mission and goals of modern societies and has a significant impact on a person's attitude to society, organizations, and the state. Influences the basic principles of human activity, organizations, enterprises, decision-making.

The values of the digital society are a system of "subject-object" relations, in which the subject is a person, and the object is any material-material, moral-ethical, eventual, and other object. This is the meaning of certain material objects, actions, phenomena; are a kind of reference point for a person and society as a whole in the process of their activities, when making decisions, etc. [4].

Knowledge is the next most important component of digital culture. In general, knowledge is structured information with a certain value. Knowledge includes the totality of intellectual property, the creative and innovative potential of the socio-economic system. Organizational knowledge is accumulated in the process of evolution of the system, forming its information memory and providing the possibility of collective decision-making in conditions of uncertainty and a stochastic environment of functioning. Digital culture is one of the communication channels through which members of the socio-economic system identify each other, through which values are transmitted and the individual is identified as part of a certain community.

The phenomenon of digital culture is often associated with the global transformation of the media as the main means of communication and information provision - from broadcast and print, with the same content for all users, to personalized and network media based on digital technologies for the transmission and processing of information content. Digital technologies are changing the nature of information material (content): it becomes automated based on digital databases. This leads to such global changes in digital information and the digital environment that we often understand digital culture as the culture of algorithmic processes (the so-called "algorithmic culture") - this is personalized content, social media channels, recommendation systems and personalized advertising on the Internet, etc. At the same time, digital databases are much more flexible than non-digital ones and provide many opportunities - search engines, Internet platforms, social networks, etc.

Transformations in media cause global changes in the way people communicate and interact in a social network, transferring them to the sphere of virtual reality and digital technologies. The movement observed in society towards computerization, informatization and the creation of a developed information and educational environment presupposes the use of such an important component as digital educational content. Digitalization and the transition of education to the Internet plane on a global scale contributed to the formation of a fundamentally new technology for obtaining education - Massive Open Online Courses. Massive Open Online Courses (MOOCs, English MOOCs) appeared in the early 2000s in the public domain on the worldwide network. The demand for such educational services turned out to be in demand, and now many world universities have new educational content on their educational sites - teaching materials, lecture courses on various topics and the most popular specialties [2].

A modern qualified specialist must continuously master new types of activities, new technologies, and improve his professional level.

As a result, there is a change in the patterns of human behavior and his perception of the surrounding reality, methods of communication and work with information. Thus, digital culture is not so much a technical and technological phenomenon as a social one. Society today is more than ever immersed in a stream of technological innovations that shape our interactions and mediate our access to things and other people. Considering the above-mentioned changes, features of digital culture, the question arises: how to carry out the study of digital culture? What phenomena, artifacts, processes, objects and objects should be studied?

The main blocks that should be explored if we want to understand the phenomenon of digital culture include the following:

- the nature of global changes underlying social and technological transformations
- the consequences of global changes and the introduction of digital technologies for the individual and society as a whole
- research of theoretical information and empirical data in the field of digital culture and its consequences
- study of changes in social communications, activities, including modern media and digital technologies / techniques

The analysis must be supplemented with a solution to the problem: how to understand what level of development the digital culture of a society, country, or person has reached? What indicators would be more or less relevant if we came to the conclusion that the mere possession of a computer or a mobile phone cannot speak of a high level of digital culture.

The level of development of digital culture can be assessed only through a set of indicators and identifying the object of further analysis. It is also necessary to find out how the use of technology contributes to the development and growth of a person, society, enterprise, state.

The solution to the main issues should include:

1. Human involvement in digital processes, digital environment.
2. The nature of use and availability of digital technologies.
3. Creativity and innovation (development of high-tech industries, jobs, creation of innovations, etc.).

Information technologies have penetrated into all spheres of life, without exception. The future belongs to the Internet of Things, blockchain and other distributed networks, automation and the robot economy. There is more and more information in general, and data processing can help create better social services, introduce innovations in industry, and in management.

A specialist who has skills in the field of digital culture knows how to use the tools offered to us by modern information technology, regardless of whether he has a specialized education in the field of information technology.

### **3 Results and Discussion**

The education system belongs to the most conservative social institutions, which is due to the natural traditionalism of the totality of social relations. On the one hand, these qualities allow the system as a whole (and society in particular) to maintain internal integrity and unity, to provide a reliable channel for the transmission of traditional values and dominant attitudes. However, on the other hand, it is conservatism that prevents the education system from flexibly responding to constantly changing socio-cultural realities. Changes in socio-economic conditions affect the needs of the economy, the guarantee of the effectiveness of which lies in innovation and dynamics, that is, in constant renewal.

We live in the age of global digitalization, which is characterized by a transition to digital algorithms underlying this system. The modern world sets new tasks for education, which require the fastest possible response. The digitalization of social relations, on the one hand, helps to solve them, on the other, it creates new problems. The state, executive power, legislative bodies on the one hand, IT companies and telecommunication networks on the other, and thirdly, the teaching community will have to work together to improve technologies, modify teaching methods, and seek the optimal balance of digital and classical education. The emerging problems need to be analyzed at least at the legislative, executive, technological, methodological levels.

Digitalization is one of the ways to make education of the same quality for everyone. Digital educational content allows you to form a personalized approach to education, it is easier to implement differentiated learning that takes into account the needs of everyone. The digital environment can create equal opportunities in inclusive education for people with special needs. The digital environment, among other things, can teach digital literacy and interaction with interfaces. These tasks are much easier to solve if digital technologies are integrated into the education process.

The movement observed in society from computerization to informatization and digitalization of education is ensured by the creation of a developed information and educational environment. The creation of educational content presupposes the use of such an important component of on-line courses, which act as mass and open ones. The creation of

educational content that allows a person to receive quality education throughout his life at any time and from anywhere in the world is an urgent task not only for the vocational education system, but also the most important direction of the socio-economic development of modern Russia. A modern qualified specialist must continuously master new types of activities, new technologies, and improve his professional level. Today it is almost impossible to get a one-time education in a higher educational institution for life. Advanced training courses and professional retraining programs are currently mastering the digital space very actively, and the concept of a digital university is being comprehended and filled with a modern thesaurus.

The task of "lifelong learning /learning through life" is becoming relevant. In this regard, distance learning plays and will continue to play an increasing role in education.

The transition of education to the global Internet space on a global scale began at the beginning of the new century, when, in the 2000s, world universities began to upload recorded courses and lectures in various fields and topics for free access [8]. The demand for such educational services turned out to be in demand, and by 2008 a fundamentally new method of education had been formed. Massive Open Online Courses (MOOC) began to provide free of charge educational materials in the open access for the most popular specialties. Most of them have gradually moved to a commercial platform, departing from the original idea of universal accessibility and free education [1].

However, there are also systems without payment, based on free access. The Massachusetts Institute of Technology - MIT, for example, has digitized the entire curriculum and made it available to everyone. It was MIT who became the founder of on-line education in the form in which it currently exists. MIT hosts its educational materials on the Edx platform. Each course includes video recordings of lectures, assignments and their solutions in pdf format. Each lecture in podcast format (10-15-20 minutes long) has a text, a separate audio or video file, or a series of such files, an electronic textbook, interactive models, and presentation slides [3].

The step-by-step study of the course is accompanied by intermediate control of the assimilation of the educational material in the form of tests and assignments during the lecture, independent thematic assignments (according to the principle of homework). Final certification is carried out in the form of credits and exams at the end of the course. Subject to the indication of authorship (observance of copyright is a mandatory legal requirement), all received materials can be used for their own purposes in the educational process. Citation allows you to translate, include material for presentations, lectures, assignments at any stage of the educational process. The duration of the course is several months, the labor intensity is over 10 hours per week, which corresponds to a university semester course of educational material. In case of successful completion of the course, a corresponding certificate is issued.

The modern digital educational environment the goal of the project is to create conditions for a systematic improvement in quality and expanding opportunities for continuous education for all categories of citizens [9-10].

The solution to this problem is possible only through the development of the Russian digital educational space and an increase in the number of students in educational organizations who have mastered online courses. This format assumes that an infinite number of people can study on the course, all the course material is presented on the Internet.

In addition to traditional curriculum materials (videos, reading and homework), massive open online courses provide the opportunity to use interactive user forums to help create and maintain communities of students and teachers, their meaningful communication.

A variety of distance learning platforms are used, separate elements of distance technologies: forum, chat, glossary, distance lecture, remote seminar, record keeping by means of a blog or twitter. MOOC relies on such methodological approaches as active

learning, which presupposes independence and internal motivation of students in acquiring skills and abilities that are important for a successful life in the modern world.

MOOC are distance learning and methodological complexes that include video lectures, slide presentations, additional material for reading or viewing, glossaries, homework in the form of projects, interactive games, tests, lists of literature on the course, questions for discussion on the forum, etc. Maximum visualization of educational material is provided with the help of video or audio fragments, slide presentations are used. As a teaching methodology, MOOC includes a complex of forms of diverse activities, which has both advantages and disadvantages.

The advantages of this teaching method include:

- the availability of communication channels with the teacher leading the course and with the rest of the course participants;
- easy-to-understand optimized information flow;
- quick feedback and assessment with the possibility of retaking the exam, test, not passed assignment;
- free training schedule;
- use of additional links to text documents, audio files, discussions on forums.

The disadvantages of the MOOC system include the lack of control over the fulfillment of tasks, as well as the format of independent study of educational material, in which the course participant cannot directly contact the teacher [1].

## 4 Conclusion

The e-learning models (web-supported, blended, online) differ in the distribution of the volume of educational material between the e-learning and auditorium components. MOOC brings the educational process, including final certification, to an online platform, that is, outside the educational institution. To implement the "online learning" model, it is necessary to make organizational decisions on the part of the leadership of the educational organization, conclude contracts and develop regulatory documents. This also applies to the issues of strengthening relations with the platform - the provider of the online course - and the university - the developer of the online course.

MOOC, as the main training platform, provide all the necessary training infrastructure. A set of materials and evaluation tools is being carried out, a system of interaction and control of participants in the implementation of training events, personal identification and control of certification are being built. Online courses are developed by the university itself in accordance with the goals and objectives of the educational program.

The movement observed in society from computerization to informatization and digitalization of education is ensured by the creation of a developed information and educational environment. The creation of educational content presupposes the use of such an important component of on-line courses, which act as mass and open ones. The creation of educational content that allows a person to receive quality education throughout his life at any time and from anywhere in the world is an urgent task not only for the vocational education system, but also the most important direction of the socio-economic development of modern Russia. A modern qualified specialist must continuously master new types of activities, new technologies, and improve his professional level. Advanced training courses and professional retraining programs are currently mastering the digital space very actively, and the concept of a digital university is being comprehended and filled with a modern thesaurus.

Thus, the use of distance learning technologies in recent years has become commonplace for professional education. The creation of educational content provides the prospect of receiving quality education throughout life at any time and from anywhere in the world,

having access to the global Internet. If certain conditions are met, “lifelong learning” becomes real for people with different capabilities and varying degrees of access to educational content.

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