Digital Transformation Processes in Education Space in Sustainable Development

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Abstract. Digital transformation processes are already affecting many areas of human activity. They are felt in all areas where there is mechanization and automation of work with information. There is a lot of talk in the business community today about how digital transformation affects business. For manufacturing enterprises, transport, services, it is associated with serious technological, organizational and cultural changes. Digital technologies are the source of the current mass development of new tools for working with information. It is natural to call them new cultural (established in culture) information tools. This process has been unfolding before our eyes for more than a decade, and everyone observes its separate fragments. Like “old” (traditional) information tools (writing, musical literacy, etc.), new tools do not appear immediately. It takes time for them to manifest themselves in all their complexity, on the basis of new technical means that support their functioning. For the “old” cultural information tools, such tools were writing instruments, counting devices, etc.

1 Introduction

Now, when the great digital unification (representation in a single digital form of textual, graphic, numerical, audio and video information) is just being completed, new information tools continue to emerge [1]. The use of word processors, spreadsheets, and other common office applications has already become a cultural norm. Tools for searching and storing information, communicators, social networks are rapidly progressing, the work with which they promise to significantly enrich the methods of artificial intelligence. The list and stability of information tools is growing, both professional (audio and video editing editors, Mathcad for calculations, R language for data processing, dictionaries, translators, geographic information systems, etc.) and general user (word processor, spreadsheets, presentation preparation tools), graphics, email, communicators, etc.) [2]. It is a thankless task to describe the multitude of new cultural information tools that are being formed as a result of the development of digital technologies. These tools are constantly emerging, updated in response to the development of the social environment, helping people to live...
and work. Three decades ago, personal computers with word processors and spreadsheets revolutionized the way information was handled in offices around the world. Since then, wave after wave of new tools have entered our lives. Today, these are mobile applications that work on any digital devices, including smartphones. Ahead is a new wave, which is connected with the Internet of things (IoT - Internet of Things), machine learning and virtual reality tools. In developed countries, education systems have already begun to prepare for its arrival. Thus, in the last year, technological design using a specialized Micro:Bit device has been rapidly spreading in educational institutions in England. These devices are now in every school. More and more educators are using them in vocational education projects [3]. At the same time, until recently, the “new” technological tools that gained the widest popularity are rapidly dying out. Thus, data carriers on laser disks (CDROM), which appeared in the early 90s of the last century and made the mass distribution of multimedia content a reality, are now quietly leaving the scene. The list of such examples is long and continues to grow. The information environment is rapidly saturated with new types of data that must be taken into account at work, in personal and social life. People are increasingly acting not only as consumers, but also as producers of information. Tools that facilitate new, previously uncommon cultural ways of working with information are increasingly entering our daily lives, and their cultural value is growing [4]. Distinctive features of the emerging new cultural information tools:

- flexibility (the ability to use them at any time and in any place where they are needed),
- reproducibility (unlimited ability to copy and duplicate),
- variability (the ability to quickly update, clarify),
- selectivity (the possibility of free search),
- individualization (the ability for each user to work with information in an individual way, which may not be reproduced by other users) [5].

The growing and ubiquitous process of forming new cultural information tools is an important factor in supporting the processes of digital transformation of education. However, the widespread practice of organizing the educational process in the system of general and vocational education opposes this. The learner is seen as a “naked person” and not as a “tool-equipped person”.

2 Research Methodology

The development of cultural digital tools raises the question for education, which physical, mental and mental abilities and how should be developed in the course of organized learning, and which of them and to what extent should be compensated (or supported in the course of their formation) by new digital information tools. The choice of one answer or another leads to different costs for the construction and equipment of educational institutions, equipping them with digital heating, developing educational and methodological materials, developing and disseminating new pedagogical practices. Thus, the digital transformation of education and the development of new digital information tools associated with it is developing several lines [6]:

- the content is being transformed, followed by the methods and forms of educational work, which are associated with the penetration of new digital tools into various areas of human activity;
- educational organizations are mastering: new digital tools that increase the efficiency of the changing organization of the educational process and the procedures that support it;
- trainees master: new cultural common user digital tools to improve the efficiency of their educational work, developing, among other things, the appropriate abilities (for example, algorithmic thinking) that are necessary for their use;
- teachers master: - new cultural general user digital tools to improve the efficiency of their production and educational work, - transforming (due to the penetration of new digital tools into various areas of human activity) content, methods and forms of educational work,
- new digital tools that increase the effectiveness of the changing organization of the educational process;
- education leaders master [7]: - new cultural general user digital tools that increase the efficiency of their production and educational work, - new digital tools that increase the efficiency of the changing organization of the educational process.

3 Results and Discussions

New cultural instruments are in the process of formation and development, which is impossible without these instruments themselves being mastered and used, including in educational organizations. Therefore, it is impossible to determine their composition for the future [8]. Teachers and learners will need to develop the ability to independently evaluate and master new tools as they become available. And this should become one of the main tasks of modern education. If we remember that each of these cultural tools has its own historical tradition and experience in working with information of the corresponding type, it becomes clear that the actual (not superficial) mastering of these tools is impossible without mastering the basics of the corresponding profession. For example, a video camera, which is built into every mobile phone, allows you to shoot a video clip. To fully use it, you need to master the basics of camera culture, learn to see the scene, choose a frame, set the light, etc [9]. New digital information tools free you from solving many technical problems and at the same time require unprecedented professionalism from each user. Waves of digital transformation of education coming one after another can be considered as a cultural phenomenon correlated with the acquisition of such professionalism. The development of the digital transformation of education is closely related to the problem of overcoming the digital divide [10]. At its core, the education system is information production, which is always carried out in the information environment. Over the past decades, we have been witnessing a transition from a “paper” to a “digital” information educational environment. At different stages of development, this transition was called computerization, informatization, and today - digitalization of the corresponding area of human activity [11]. A rough metaphor for such a transition can be, for example, the transition from sailboats to ships with steam engines in navigation. Like the “steam technologies” of the past, digital heating is rapidly improving, getting cheaper, becoming mass-produced, and replacing the “paper” information technologies that preceded them. The penetration of digital transformation into all spheres of human activity, the displacement of “paper” technologies by them is proceeding unevenly. There is a gap between those who have access to digital heating and those who, for one reason or another, do not. Naturally, those who have access to DH find themselves in a privileged position. The divide that arises due to inequality in access to digital technologies is commonly referred to as the “digital divide” [12]. The digital divide between different countries or regions of the world is often described as the “global digital divide”. People, organizations and states that do not have access to digital heating (or their access to them is limited) are deprived of noticeable advantages compared to those who have such access. The result of the digital divide is socio-economic inequality [11]. In education, the digital divide is related to the differences that arise between those participants in the educational process who have access to the Internet and digital devices, tools, sources and services at school and at home, and those who do not have such access. This digital divide is naturally referred to as the “technological digital divide”. The development of information and communication technologies leads to its reduction. The accessibility of DH is growing rapidly, and in the next decade, the technological digital
divide will turn from a significant factor in the spread of the digital divide to a negligible one. Studies show [11], as the technology digital divide in education is being bridged, the digital divide is beginning to widen.

The “new digital divide” is the disparity between those who actively use digital transformation to perform productive, creative work (to perform development; mechanize organizational work; maintain collaboration, research, observation, design, etc.), and those who use DT is passive, only to perform traditional routine functions (as a provider of audiovisual information; as a communication reproducing a traditional telephone, etc.) [12]. A new digital divide is being observed in all areas where DT is emerging, among all social groups and different strata of society, in communities with high and low proportions of the poor. It exists in schools and universities. Overcoming the new digital divide requires a change in educational policy and the tasks of reforming general education. The tasks of forming thinking and digital literacy are coming to the fore.

4 Conclusions

Modern man has long been a “man equipped with tools”. The computer became the first mass and universal tool for working with information. Modern computer programs allow you to work with texts in a new way (search, editing, compilation, etc.), with calculations (spreadsheets, tools for processing statistical information and working with big data, automatic formal transformations of mathematical expressions, etc.). In our country, these changes are not yet paid attention to. But already in the next 5–10 years, education management workers and methodologists will have to adjust their positions. They will be forced to take into account the massive dissemination of new digital information tools and reconsider traditional decisions regarding the verification of the achievement of educational results and the definition of the content of general education (including within the framework of standard curricula). One of the obvious solutions will be the use of intelligent computer evaluation of students’ educational results in the course of state final attestations (including the USE). However, the spread of global information systems and artificial intelligence methods promises fundamental changes.

Today, the main focus and time of the teacher’s educational work is concentrated on providing students with data, familiarizing them with information, transferring knowledge and building their understanding. Much less time and attention is paid to the formation of the ability for expertise and, most importantly, the ability to transfer the acquired knowledge and skills to new areas. The evaluation of learning achievements regarding examination and transfer remains outside the scope of a systematically organized educational process. At the same time, the formation of the ability to solve practical problems and transfer this ability to new situations to solve new problems, to use the experience of such a transfer for independent mastering of the new has always been and remains one of the main desirable results of education. To realize the opportunities that are opening up, not only appropriate theoretical developments in the field of the content of education are required. It is necessary to reduce the amount of subject material required for study and, due to this, to significantly deepen the mastery of basic concepts, to allocate enough time for the formation of the ability to transfer, for the students to successfully independently master the material they need. Such work is an indispensable component of efforts to update the content of education in the school of the information age.

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