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Effective ways of digital media usage in school education

Эффективные способы использования цифровых медиа в школьном образовании

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Abstract

Our society is increasingly dependent on digital media. Socio-economic changes in Russia and the information explosion that has affected the whole world require a revision of traditional systems, content, methods and technologies of education in the context of various media usage. **The purpose of this research** is to theoretically substantiate, develop and experimentally prove tools for effective usage of digital media in the educational process of secondary schools in Russia. According to the purpose and hypothesis, **the objectives of this research** are: to define the essence, functions, didactic and educational possibilities of digital media; to identify pedagogical aspects of their usage in education; to determine structural components of teachers' readiness to using digital media in their work; to develop tools for using digital media in the educational process of secondary schools; to prove experimentally the effectiveness of the developed tools. **The research object** is the educational process of secondary schools under conditions of digitalization of the Russian education. **The subject of this research** covers tools of effective usage of digital media in the educational process of secondary schools. **The methodological basis** of this research was the philosophical concept of dialectical cognition as the basis of scientific pedagogy; the theory of system-complex and personal-activity approaches to the study of pedagogical phenomena, the integration concept of science, education, technology and production. **Results:** based on the analysis of theoretical sources on the use of digital media in education and the own diagnostic study, the author determined and experimentally tested possible ways of applying digital media as pedagogical tools taking into account their functional load: as means for transforming traditional tasks in a special form; as a teaching assistance instrument;

Аннотация

Наше общество становится всё более зависимым от цифровых медиа. Социально-экономические изменения в России и информационный взрыв, затронувший весь мир, требуют пересмотра сложившихся систем, содержания, методов и технологий образования в контексте использования различных информационных и коммуникационных средств. **Целью настоящего исследования** является теоретическое обоснование, разработка и экспериментальное обоснование инструментов эффективного использования цифровых медиа в учебном процессе общеобразовательных школ России. В соответствии с целью и гипотезой, **задачами данной работы** являются: определение сущности, функций, дидактических и воспитательных возможностей цифровых медиа; выявление педагогических аспектов их использования в образовании; определение структурных компонентов готовности педагогов к использованию цифровых медиа в своей работе; разработка инструментов использования цифровых медиа в учебном процессе; экспериментальное обоснование эффективности разработанных инструментов. **Объектом исследования** является образовательный процесс в контексте цифровизации российского образования. **Предметом** работы выступают способы эффективного использования цифровых медиа в образовательном процессе школы. **Методологической основой** настоящего исследования явились философская концепция диалектического познания как основы научной педагогики; теория системно-комплексного и личностно-деятельностного подходов к изучению педагогических явлений; интеграционная концепция науки, образования, техники и производства. **Результаты:** на основе анализа теоретических

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as a communication means; as a reality modeling tool.

Key Words: digital media, digitalization of education, education, effective use of digital media in education.

Introduction

Modern secondary school operates in special conditions. Their specificity is largely determined by the global process of informatization and digitalization of our society, culture, education. Digital media play an important role in the lives of not only adults but also children, teenagers. According to various sociological studies of the recent years, among different information sources and transmission channels, which are chosen by schoolchildren, the digital media are an undisputed leader. Teenagers increasingly organize their leisure time with the help of various media, and include the information obtained in this way in their communication with friends, parents, teachers.

Nowadays, the term 'media' is used as an analogue of the concept of information and communication tools, these include print, photography, radio, cinematography, television, video, multimedia computer systems, including the Internet. While in the formulations of 'media' adopted in different countries, as a rule, there are no discrepancies, they differ only stylistically.

"The development of 'new media' during the last decades has had an undeniable and huge impact on people's behavior, and the use thereof has increased steadily and significantly" (Strasburger, & et al., 2013). The scale of the media influence on various life spheres increases every day. This aspect poses new challenges to the educational system, requires from a person not only knowledge of modern technical devices and the ability to work with them, but also a certain level of critical thinking (the ability to interpret media messages, understand different media texts), skills of independent creative work

источников по использованию цифровых медиа в образовании и собственного диагностического исследования автором определены и экспериментально проверены возможные способы применения цифровых медиа в качестве педагогических средств с учетом их функциональной нагрузки: как средства преобразования традиционных задач в специальную форму; как инструмент педагогической помощи; как средство коммуникации; как средство моделирования действительности.

Ключевые слова: цифровые медиа, цифровизация образования, образование, эффективное использование цифровых медиа в образовании.

related to the search, processing and presentation of information material, and so on, what is extremely valuable is the ability to navigate in the personal information field and in the existing media world as a whole. On the one hand, "... teacher candidates need to adapt themselves to the technology that is developing every day ... our students use computers, laptops, Internet and smart phones all the time, it is inevitable that prospective teachers ... can face some problems and difficulties" (Debeş, & Oznacar, 2019, p. 245). On the other hand, the role of teacher is becoming more complicated and significant as they should help students to get oriented in the complex information world (Angeli, & Giannakos, 2020).

This research is aimed at analyzing various aspects of students' media usage, didactic potential of digital media for the secondary education, difficulties that school teacher face in the digitalization process and possible ways of digital media use in education.

Theoretical framework

Russian Minister of Education Olga Vasilyeva said that the performance of Russian students in the international PISA study "sagged" because Russian schools have not built logistics for "knowledge acquisition" using a computer (Mel, 2019).

According to surveys, the time spent by children watching television programs or working on a computer, already exceeds the time they spend at school (Yakushina, 2000). A.A. Zhurin notes that information obtained from various media

sources, unlike educational material at school, has a number of attractive properties for children: it is emotionally colored, relevant, accessible to understanding, does not require memorization and is not a subject to evaluation by teachers or other adults. All this makes media as a source of information more attractive to students than school lessons (Zhurin, 2005).

M.D. Goryachev emphasizes that the media impact on students has its own characteristics, consisting primarily in the fact that this impact is "unorganized". Specific is the nature of perception, which differs from the perception of information in the classroom. In addition, the information and communications tools have an indirect impact through the social environment (friends, parents, teachers, etc.) (Goryachev, 1989).

Being active users of various media, students, however, do not always understand the true meaning of messages, motives and mechanisms of their creation. It is worth noting that the information transmitted through media channels is often aimed at manipulating the consciousness of the consumer with political, economic or other goals. Students can consciously avoid necessary, but complex educational programs, serious socio-political programs, placing themselves in a kind of "information cocoon" and isolating themselves from the real world, live in virtual reality. This can play a negative role of an intangible barrier that entails information limitations of the cognitive process and the actual existence of the individual (Zaznobina, 1995).

L.S. Zaznobina (1999), A.V. Fedorov (2001a) and some other researchers note that with the help of the media, teenagers do not look for "knowledge" that they "did not get at school" – the desire to have fun comes first, but many media perform educational and upbringing functions. For example, some television programs and Internet sites contain information associated with the school subjects, but this didactic potential is not taken into account, as a rule, the impact of many information flows on students is not regulated by anyone (Mantulenko, 2005). On the other hand, despite the curiosity of children, school materials seldom make complex and abstract topics attractive. That may result in the lack of attention and low cognitive activity of pupils (Anger, Koppel, Plünnecke, Röben, & Schüler, 2018). According to I. Kmecova (2020), digital media create a new space in the framework of the educational process for creative human activities at the expense of the automatization of mechanical and reproductive actions.

Methodology

The research sources are psychological and pedagogical ideas of modern didactics concerning the informatization and digitalization of education (A.V. Sharikov (1992), E.S. Polat (1991), A.I. Rakitov (1994), I.V. Robert (1994), Yu.D. Babaeva, & A.E. Voiskunsky (1998), L.S. Zaznobina (1999), A.V. Fedorov (2001b), A.A. Zhurin (2001), A.V. Osin (2004), etc.), the creation and use of learning tools (A.A. Zhurin (2005), etc.), specific features of information perception by children and teenagers, didactic and educational opportunities of digital media (E.I. Mashbits (1988), S.B. Tsymbalenko, A.V. Sharikov, S.N. Shcheglova (1998), O.V. Danilenko (2000), G.I. Datsyuk (2001), S. Khan (2018), A.P. Castro, M. Raposo-Rivas, M.E. Martinez-Figueira (2018), etc.).

Conceptually, the following aspects are essential for our study:

- the main provisions of the pedagogic methodology and (media)pedagogic research methods (Krayevsky, 1994), Zagvyazinsky (2005), S. Feierabend, & W. Klingler, (2000, 2003), etc.),
- concepts of humanization of education (V.P. Bezdukhov (1997), A.A. Melik-Pashayev (1989), etc.),
- theory of personality-oriented education (E.V. Bondarevskaya (1997), V.V. Serikov (1999), etc.),
- research on the use of media in the educational process (S. Aufenanger (2019), D. Baake (1997), O.V. Danilenko (2000), G.I. Datsyuk (2001), I.G. Zakharova (2003), L.J. Issing (1994), E. Klochkova, O. Ledneva, N. Sadovnikova, E. Darda, & L. Oveshnikova (2019), etc.),
- modern concepts of students' health protection in the conditions of informatization and digitalization of education (A.V. Fedorov (2001b), E.A. Bondarenko, A.A. Zhurin, & I.A. Milutina (2004), U.H. Bittlingmayer, K. Dadaczynski, D. Sahrai, S. van den Broucke, & O. Okan (2020), etc.).

The experimental base of this research were municipal educational institutions of Samara, secondary schools № 37, 76, 116, 158, 44, Samara State University, as well as the Samara branch of the Federation of Internet Education. The experimental part of the study affected 320 people: 240 of them – schoolchildren, 30 teachers of secondary schools, 10 HEIs teachers and 40 HEIs students.

To solve the research tasks, the author used a set of complementary methods adequate to the subject of the study: analysis of philosophical, psychological, pedagogical and methodological literature on the research problem, the study and generalization of pedagogical experience, empirical methods (observation, questioning, ascertaining and forming experiments; analysis of experimental results).

The reliability of the research results is provided by the validity of the methodology, its relevance to the research problem, conducting research on the theoretical and practical levels; usage of complex methods, and the representativeness of the sample.

The main provisions and results of the study were discussed at methodological seminars of postgraduates at Samara State University from 2003 to 2014, presented in reports at scientific and practical regional, all-Russian and international conferences. Implementation of the research results was carried out within the framework of the developed optional course for students of 8th-9th forms of secondary school No. 37 of Samara, in the process of teaching students of Samara State University in the framework of pedagogical and psychological disciplines.

The research was carried out in several stages:

In the first phase, the author studied the extent of the problem on the usage of digital media in the educational environment analyzing philosophical, psychological and pedagogical literature, foreign experience of media-pedagogical work, and preparing the conduct of the experimental phase. By the end of this stage, we identified the research purpose, object, subject and objectives, formulated a research hypothesis.

At the second stage, a purposeful study of pedagogical aspects of using digital media in the educational process was conducted, experimental work was carried out to determine the level of interest and readiness of students and teachers to use digital media in educational and teaching activities, respectively; the obtained data were analyzed and conclusions were formulated. On the basis of the results of diagnostic work, we determined tools of effective usage of digital media in the educational process of secondary schools and experimentally tested them.

At the third stage, the experimental work results were analyzed, generalization and systematization of the obtained data were carried

out, methodological recommendations on the use of digital media in educational and professional pedagogic activities were developed, the hypothesis provisions were checked.

Results and discussion

In addition to determining the nature, functions, educational opportunities of digital media and studying the pedagogical aspects of their application in the educational process, the objectives of our study were also to determine the interest and readiness of students and teachers to use new media in their work, the development and experimental testing of ways of effective digital media application in the educational process.

The nature of interaction between modern schoolchildren and digital media was studied in the framework of an empirical study. For the survey of schoolchildren aged 7-14 years, a questionnaire was drawn up, the questions of which affected various spheres of pupils' life, due to their relevance, aroused children's interest / desire to share their experiences and problems of interaction with media.

The following topics were discussed during the survey:

- ways of free time spending;
- thematic interests;
- media provision;
- media addiction,
- computer use,
- Internet and social media use.

The analysis of the survey results showed that 7-14-year-old-students already have a rich media experience. Among the most common ways of spending free time, there were watching television programs, videos, listening to music, radio. Almost half of the respondents organize their leisure time most often with the help of a personal computer.

Thematic interests of schoolchildren vary depending on age and gender. However, in general, topics related to computer, television, and Internet are interesting for more than 50% of the survey participants. The interest in various digital media and popular media products (f.e. social networks) increases with age (Zotova, Mantulenko, Timoshchuk, Stašová, 2020).

Many children grow up in a well-technically and media-equipped environment, which provides broad opportunities for children to work independently with various electronic devices

and digital media. Almost 90% of students aged 7-14 years are able to work with a computer, while the majority use it every day or almost every day, most often at home or with friends, and only 2.5% of respondents – at school. As a rule, the computer is used for games, watching movies, listening to music, but practically does not find any use for educational purposes. The same should be said about the Internet.

With age, the number of Internet users among schoolchildren increases, the so-called "Internet socialization" of most pupils is associated with their own parents, who, however, do not sufficiently monitor what their children are doing on the computer and in the global computer network. Students use the Internet most often to find information they are interested in (music, games, etc.), or useful material for their school tasks. Very often the Internet is used as a communication means (e-mail, SMS, social networks and messengers).

Despite the fact that children have communication experience via electronic media and a high interest in the use of these technical means in the education, they are not still aware of rich educational opportunities of digital media, specific ways of using them for educational purposes. To solve this problem, it is important not only to provide schools with a good technical equipment, but also to develop the willingness and desire of teachers to use digital media and their didactic potential in their work.

Modern information conditions impose new requirements to the personality of teachers, their professional qualities, functions and role in the educational process. Digital media due to their specific characteristics are able to model the teachers' activities to a certain extent, but they are unlikely to be able to completely replace teachers, giving them only the role of an observer (assistant) in the foreseeable future.

The teacher cannot and should not ignore the impact of information and communication tools on the educational process, the need to harmonize, adjust numerous information flows aimed at modern students, the availability of the educational potential of digital media and the need for its inclusion in the educational process. It is believed that the teacher of today must be able not just to properly use existing media products for educational purposes, to involve those or other information resources, but also to develop their own training products, effective use electronic media both at the stage of preparation for classes, and during their conduct, as well as in the process of improving their own skills.

Flexibility of the teachers, their engagement, creative activity by the use of modern technical achievements in their work is one of the determining conditions for the successful use of modern information and communication technology in the educational process (Mantulenko, 2007).

The study of the experience of domestic and foreign researchers on the considered issues allowed to present the teacher's readiness to digital media use in the educational context as an integrative characteristic, including the following components: informational, motivational, target, activity.

Our empirical study among the students of the listeners (school teachers) of the Samara Federation of the Internet Education gave the following results.

- many teachers have at their disposal a fairly rich arsenal of technical means, they mostly use TV/ video/CDs at their lessons to increase the cognitive activity of students, make classes more interesting,
- most teachers receive information about new media products for educational purposes and possibilities of their usage for teaching activities at different training courses / during re-training programs;
- however, a half of teachers at the final stage of their retraining indicated that they do not intend to use any technical means in their work; those who already use media in teaching school subjects prefer reproductive types of media work.

Based on the received results, we can suggest that today in the structure of teacher's readiness to use digital media in the educational process the motivational component is especially significant. And the emphasis on the teacher's motivation should be made at the stage of any professional retraining first of all.

The theoretical development of the issue on the use of digital media in education and our own diagnostic study formed the basis for the classification of the functional load of media, allowing them to be used as pedagogical tools. In our opinion, the main ways of using digital media in education are:

- as means by which traditional school tasks are processed in a special form;
- as a teaching assistant;
- as a communication means;
- as a reality modeling tool (Mantulenko, 2007).

Testing these ways was carried out in the conditions of the natural pedagogical experiment. The initial setting was the idea that the expected result will be achieved in the presence of closely interrelated indicators, the key one of which is the cognitive activity of schoolchildren.

Increasing cognitive activity through the formation of sustainable cognitive interest implies consistent work of students with digital media and media products while learning various school subjects with the focus on such elements as the educational content, the learning process itself and the personality of a teacher.

At the end of the experimental program, all three effectiveness criteria of the developed ways were achieved:

- increased cognitive activity was expressed in questions asked by students of the experimental group, the desire to participate in the discussion of various topics, to express their own point of view, to perform additional creative tasks, the desire to apply the acquired knowledge to different situations, to share the accumulated experience of working with digital media with others, to participate in the organization of school classes,
- the improvement of academic performance allows us to say that the students of the experimental group by the end of the year were able to improve their grades in more subjects than their peers from the control group,
- the survey data show the satisfaction of students with school life, in particular, representatives of the experimental group have more favorite subjects, more often work on individual tasks, more skillfully and consciously use certain media, more often involving them in the study (Mantulenko, 2007).

Thus, the effectiveness of the identified ways of digital media use in the educational process has been experimentally confirmed.

Conclusions

The global process of informatization and digitalization of our society and culture poses new challenges to the educational system. One of the ways of education of an independent, creative personality, able to develop efficiently in the existing media world, is a purposeful, thoughtful inclusion of modern information tools in the educational process. Modern media act as a

comprehensive means of human development, and such specific features of electronic media as multimedia, interactivity, modeling, communication and productivity, allow us to talk about new educational functions of media and develop media products for educational purposes on this basis, information training technology.

Modern information and communication technologies allow to individualize and intensify the educational process, even within the group training. Digital media make fundamental changes in the content and teaching methods, allow using a special type of tasks for pupils' reflection of their activities, its self-regulation. Digital media, due to their specific characteristics, enable better perception and remembering the material, improve the degree of ergonomic principles to the educational materials, have rich educational opportunities. Their use in the educational process is focused on the formation of cognitive motives of students. Taking into account the pedagogical aspects of using digital media in the educational process is important for restructuring the education system in accordance with the requirements of the modern information society.

The Russian state program of school computerization and digitalization in general have not changed the current situation yet, characteristic features of which are a natural use of media by students and lack of competent media-consumption in the process of teaching various educational disciplines. This situation is largely determined by the unwillingness of teachers to use any technical means in their work. To create the necessary motivation, to form adequate ideas of teacher's new role, which will be implemented in the constantly changing information environments, is today the key moment of teachers' retraining. Together with the motivational component in the structure of teacher's readiness to use digital media in the educational process, an important role also belongs to other ones: target, information, and activity components.

Due to their specific features and educational opportunities, digital media can be used in the educational process of secondary schools as a means of obtaining and processing information in a special form; as a teaching assistant, as a communication means, as a means of modeling reality. When implementing these tools in practice, it is necessary to rely on the principles of reasonable using digital media, the maximum approximation to needs, capabilities and characteristics of students, the priority of the humanistic approach to the hardware and

technology; minimization of non-subject information, practical value of knowledge and obligatory use of products of educational activity, "friendly" interaction with participants of the educational process; computer security.

The efficiency of digital media usage ways in the educational process is shown in such indicators as increase in the cognitive activity and independent work capacity of pupils, improvement of their academic progress, positive attitude to the educational process and school life as a whole. The initial interest of students in the use of digital media in the education is an important motivational component, the further implementation of which should be based on the fact that the main sources of the cognitive activity development are the content of educational material, the learning process itself and the personality and the professional competences of the teacher. High cognitive activity, in turn, leads to improved student's performance and has a direct positive impact on the student's attitude to educational activities.

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