

Innovative Development of the Modern School in the Conditions of Digitalization of Education

 Kadyrova Rano Mamadjanovna¹,  Bichurina Seimbika Usmanovna²,  Djamilova Nargiza Nuritdinovna^{3*}

^{1,3}Tashkent State Pedagogical University named after Nizami, Nizami State Pedagogical University, Tashkent, Uzbekistan.

²Kazan (Volga) Federal University, Kazan, Russia.

*Corresponding author: Djamilova Nargiza Nuritdinovna (Email: djamilova0707@gmail.com)

ABSTRACT

Purpose: The article reveals the importance of the development of modern schools in the Republic of Uzbekistan based on digital technologies that allow teachers to use online learning platforms, which allows students to learn at their own pace and access information from anywhere in the world.

Design/methodology/approach: One of the innovative developments in modern schools is the application of a student-centered approach to learning. It allows them to take responsibility for their own learning and become active participants in the educational process.

Findings: The digitalization of education allows the effective use of digital technologies to solve the problems of education at the current stage of society's development. Innovative processes help to find a way out of stagnation, serve as an effective means of resolving contradictions, transition from the statement of existing problems to the search for their rational solution.

Conclusion: However, modern primary schools in our region are quite heterogeneous and are in a transitional stage of their formation. In general, they represent a variety of organizational and pedagogical, scientific and methodological approaches, not adapted to specific curricula teaching methods, where pedagogical conditions play a significant role in the implementation of the main substantive principles and directions of pedagogical innovation.

Keywords: Digital transformation, Elementary school students, Innovation processes, Modern schools.

1. INTRODUCTION

At present, Uzbekistan is undergoing the formation of a new system of education, oriented towards entering the world educational space ([Republic of Uzbekistan, 2019](#)). This process is accompanied by significant changes in pedagogical theory and practice of educational process. There is a modernization of the educational system - different contents, approaches, behavior, pedagogical mentality are proposed.

The principle of variability has been proclaimed in the Uzbek educational system, which gives the pedagogical teams of educational institutions the opportunity to choose and design the pedagogical process according to any model, including author's models. The progress of education also goes in this direction: development of various variants of its content, use of the possibilities of modern didactics in increasing the effectiveness of educational structures; scientific development and practical justification of new ideas and technologies. In this case it is important to organize a kind of dialogue of different pedagogical systems and teaching technologies, approval in practice of new forms - additional and alternative to the state system of education, use in modern conditions of integral pedagogical systems of the past. In these conditions, the teacher must be oriented in a wide range of modern innovative technologies, ideas, schools, directions, not to waste time discovering what is already known, but to use the whole arsenal of Russian pedagogical experience.

In the conditions of digital transformation, the domestic educational system makes new demands on teachers aimed at the formation of digital competence. Digital literacy has many different aspects and characteristics, covers many areas of knowledge and develops rapidly in parallel with the emergence of new technologies. The definition of digital competence of teachers concerns "basic skills" or the ability to work in an information and educational environment, the ability to use office software,

Many works by modern researchers, including [Verbitsky \(2019\)](#); [Poddubnaya and Zadneprovskaya \(2020\)](#); [Skibitsky \(2021\)](#); [Zadneprovskaya and Poddubnaya \(2020\)](#) and [Kozlova and Kozlov \(2020\)](#) are devoted to the study of various aspects of the problem of digitalization of education.

The research problem is the following: what are the trends of digital transformation of education in modern conditions? [Blinov, Sergeev, and Yesenina \(2019\)](#) and [Petrova \(2018\)](#) consider the main ideas of the didactic concept of digital professional education, the design of the learning process and its support. [Zenkov \(2020\)](#) points out that digitalization of education is becoming a mainstream direction of its development. [Plotnikov \(2021\)](#) notes that the use of end-to-end technologies not only improves traditional educational methods and approaches, but also develops relatively new ones, such as gamification and personalization of learning. [Gambееva and Sorokina \(2020\)](#) investigates the digital transformation of the educational process; [Sergeeva and Chandra \(2020\)](#); [Slavutskaya, Abrykov, Slavutskii, Bichurina, and Sadovaya \(2020\)](#) propose the application of digital technology capabilities in modern education. [Bialik and Fadel \(2018\)](#); [Poddubnaya et al. \(2021\)](#); [Agoshkova, Ozheva, and Poddubnaya \(2020\)](#); [Uvarov \(2018\)](#); [Verbitsky \(2019\)](#) and [Sergeeva and Chandra \(2020\)](#) and others consider digitalization as a new content of the content of modern professional education in higher education, the tendency to change towards the creation of electronic information and educational environments of universities and ensuring the quality of education. [Nizamova \(2022\)](#) studies the process of digitalization in the system of general education in Russia; [Kashitsin \(2020\)](#) notes the need to develop an educational platform not only for students and teachers, but also for parents. [Alieva, Alekseeva, Vandanova, Kartashova, and Rezapkina \(2020\)](#) consider the issues of management efficiency of regional education systems, introduction and functioning of the target model of digital educational environment (DEE) in educational organizations. [Barashkina, Dzhum, Korneva, Dunets, and Karpenko \(2021\)](#) demonstrate a new vision of education in the era of artificial intelligence and unlocking the potential of technology. [Zaramenskikh \(2018\)](#) and [Nesterenko \(2019\)](#) consider the issues of digital services, reveal the features of digital service in education. [Skibitsky \(2021\)](#) shows that the transition to result-oriented (or competence-oriented) personalized organization of the educational process allows solving the problems of improving the quality of education and upbringing at a new level, which currently remain insoluble under the traditional system of educational organization.

Digital transformation leads to changes in pedagogical practice depending on the nature of the integration of digital technologies into the educational process.

Despite the abundance of methods and tools used to develop digital skills of teaching staff in general and professional education, it is worth noting that the level of digital skills of teachers is not changing as quickly and linearly as one might expect. This is due to the following problems: the lack of a systematic approach to the organization of continuous professional education of teachers; the orientation of traditional teacher development programs to a limited list of services and applications, which becomes outdated over time; the lack of access to the necessary hardware and software in educational organizations.

In our opinion, the development of innovation processes in the system of primary education is hampered by such factors as the lack of scientific and pedagogical support for innovation processes; the lack of qualified personnel possessing the innovative potential of a modern teacher. The above-mentioned points to the existing contradiction between the requirements of the approved strategy "Digital Uzbekistan-30" and its inconsistency in the educational process in elementary school. Based on the above, we determined the research topic "Information development of modern school in the conditions of digitalization".

The introduction should end with a clear statement of the purpose of the work.

In order to identify the state of the researched issue in practice, we conducted a survey with elementary school teachers of Yunusabad district of Tashkent city, in which 43 teachers participated. This survey was carried out during October-November 2022, in school 268, where methodological associations for primary grades were held. In accordance with the goals and objectives of the study, we conducted a survey of teachers, they were offered a questionnaire containing 7 questions. The analysis of the survey results showed the following:

1. Age of teachers: from 21 to 30 years old - 10 teachers; from 30 to 40 years old - 8 teachers; from 40 to 50 years old - 7 teachers; from 50 to 60 years old - 7 teachers; from 60 and above - 11 teachers.
2. Teacher's work experience: from 1 to 5 years - 4 teachers; from 5 to 10 years - 12 teachers; from 10 to 15 years - 9 teachers; from 15 to 20 years - 8 teachers; from 20 and above - 10 teachers.
3. Correct definition of the concepts "Innovative technologies", "digitalization" was given by - 12 teachers; incorrect - 31 teachers.
4. Teachers mainly use TV in the process of learning activities.
5. Teachers noted that currently there are no methodical recommendations on the use of innovative technologies in the conditions of digitalization for conducting lessons.
6. Teachers mainly experience the following difficulties: lack of necessary technical means (computer, electronic board, etc.); lack of computer rooms for primary grades; lack of knowledge and practical skills of using innovative technologies in teaching elementary school students.

One of the conditions of our experimental work was the development of tools for feedback on the subjects of primary education. In order to improve the process of teaching elementary school students with the use of innovative technologies, teachers proposed the following: to create an author's team of scientists and practicing teachers to develop scientifically based methodological manuals on the use of innovative technologies in the process of each subject in elementary school; the district department of public education to systematically organize trainings on the use of innovative technologies in elementary school; in the mass media, to organize training sessions on the use of innovative technologies in elementary school; to organize training sessions on the use of innovative technologies in elementary school.

The above indicates the presence of contradiction between the State Program on the implementation of the strategy on 5 priority directions of development of the Republic of Uzbekistan and its effective implementation, development of digital economy and wide introduction of modern information and communication technologies in all sectors and spheres, and their inconsistency in practice.

To eliminate the above-mentioned contradiction, we have developed a draft model "Innovative development of modern school (Primary grades) in the conditions of digitalization of education", program and methodological support of its implementation in the practice of elementary school.

The model presents: target requirements (Activity, educational, content), didactic principles of organizing the activities of primary school students (grade 1 - the principle of psychological comfort; grade 2-3 - the principle of activity), technologies of the activity method: motivation (self-determination) to learning activities; actualization and recording of individual difficulties in a trial learning action; identification of the place and principles of difficulty; construction of a project of exit and difficulty (goal and topic, method, plan, means); realization of the constructed project; primary consolidation with the pronunciation in external speech; independent work by self-checking against a standard; inclusion in the system of knowledge and repetition; reflection of learning activity.

Typology of lessons: "Discovery" of new knowledge; reflection; general methodological orientation; developing control. Learning outcomes: during the period of a student's education in elementary school, the following digital competencies should be formed in him/her: information literacy; communication and cooperation skills; safety skills; problem-solving skills.

Based on the developed program and methodological materials, we conducted a formative experiment on the basis of school No. 88 of Yunusabad district of Tashkent city, 50 3rd grade students took part in it. Of them, the experimental group - 25 people, the control group - 25 people.

The experimental work was carried out on the basis of the textbook "Natural Sciences" for the 3rd grade and methodical manual for teachers on this subject. Lessons were conducted daily on Monday and Thursday. A total of 51 lessons on 33 topics were conducted.

During the lessons we realized the following goals: activity - formation of thinking operations; educational - formation of a system of values; content - formation of a picture of the world. Teaching activity was carried out taking into account the principles of psychological comfort and activity. The principle of psychological comfort implied the creation of motivation for learning activity in pupils, the principle of activity - obtaining knowledge by the child not in a ready-made form, but in the process of his/her own learning and cognitive activity (the technology of the activity method of teaching by L.G. Peterson). The use of the technology of the activity method in the educational process promoted: motivation (self-determination) of students to learning activity; actualization

and fixing of individual difficulties of a pupil in the learning process; identification of difficulties; construction of a project, means, ways out of difficulties, realization of the constructed project; primary consolidation with external speech; organization of independent work on self-checking; inclusion in the system of knowledge and repetition; reflection of learning activity. We redesigned the lesson outlines taking into account the following typology: lessons of "Discovery" of new knowledge; lessons of reflection; lessons of general methodological orientation; lessons of developing control. Each type of lesson had an activity and content goal. After passing each section of the subject "Natural Sciences", pupils were offered to perform logical tasks. The results of performing logical exercises by pupils of the experimental and control groups after passing each section were analyzed both quantitatively and qualitatively. In the experimental group we used logical tasks for pupils with the use of digital technology (TV, interactive whiteboard, musical accompaniment). The arithmetic mean data of the results of students' mastering of knowledge in the experimental and control groups by the example of the subject "Natural Sciences" are presented in Table 1.

Table 1. Dynamics of knowledge assimilation in the subject "Natural Sciences" by pupils of experimental and control groups.

No	Name of chapters	Experimental group		Control group	
		Completed tasks (+)	Did not fulfill the tasks (-)	Completed tasks (+)	Did not fulfill the tasks (-)
1	Nature	16-64%	9-36%	15-60%	10-40%
2	Living organisms	17-68%	8-32%	14-56%	11-44%
3	Structure of organisms	18-72%	7-28%	16-64%	9-36%
4	Life processes	22-88%	3-12%	19-76%	6-24%
5	Habitat	22-88%	3-12%	17-68%	8-32%
6	Our planet	19-76%	6-24%	16-64%	9-36%
7	Natural resources	19-76%	6-24%	15-60%	10-40%
8	Natural resources	19-76%	6-24%	15-60%	10-40%
9	Weather	21-84%	4-16%	20-80%	5-20%
10	The solar system and planet earth	20-80%	5-20%	19-76%	6-24%
11	Light and sound energy	19-76%	6-24%	16-64%	9-36%
12	Motion	19-76%	6-24%	17-68%	8-32%
13	Force	20-80%	5-20%	17-68%	8-32%
14	Arithmetic mean	19-76%	6-24%	17-68%	8-32%

The analysis of students' knowledge showed that in the experimental group 19 students (76%) mastered the program material in the subject "Natural Sciences" on average, and in the control group - 17 students (68%); 6 students (24%) did not master it in the experimental group and 8 students (32%) in the control group. Thus, we can see that in the experimental group the level of students' mastering of educational material in the marked subject is 8% higher than in the control group; the level of students' failure to master knowledge in the control group is 8% lower.

In our opinion, the increase in the level of mastering the content of the subject "Natural Sciences" in the experimental group is due to the fact that in this group during the entire school year in the lessons were used technical means of education (TV, computer, projector, music, interactive whiteboard, etc.) and in the control were used logical tasks developed by us for each chapter. During the experimental work, we also revealed difficulties in performing logical tasks by pupils in both the experimental and control groups. In Chapter 1 "Nature", task No. 2 - to specify the stages of research - 15 pupils in the experimental group failed to fulfill the task, and 17 pupils in the control group; in Chapter 5 "Habitat", task No. 2 - to identify factors influencing the formation of habitat - 3 pupils in the experimental group failed to fulfill the task, and 10 pupils in the control group; in Chapter 6 "Our Planet", task No. 3 - to explain how natural factors cause changes in relief - 6 pupils in the experimental group failed to fulfill the task, and 8 pupils in the control group failed to fulfill the task; in Chapter 7 "Natural Riches" task No. 2 - name the professions related to mining - 8 students failed in the experimental group and 13 students in the control group; task No. 3 - what minerals are mined in the process depicted in the photos - 6 students failed in the experimental group and 12 students in the control group; in chapter 10 "Light and Sound" assignment #2 - explain

the different ways of obtaining electricity - in the experimental group 6 students failed, control group - 8 students; assignment #3 - what types of energy can be observed in the operation of the following electrical appliances, such as iron, light bulb and hair dryer - in the experimental group 5 students failed, and in the control group - 12 students; in Chapter 11 "Motion" task #2, express your opinion about the position of animate and inanimate objects depicted in photographs - 6 students in the experimental group failed in the task and 8 students in the control group; in Chapter 12 "Force" task #2 - Imagine that in front of you there are pieces of wood, glass, cardboard and sandpaper of the same rectangular shape and the same size. If you were to push them with the same force across a smooth table, which of the pieces would travel farther than the others? Why? - 6 students in the experimental group failed to fulfill the task, and 10 students in the control group. Failure to perform logical tasks by EG and CG pupils can be explained by the fact that they were incomprehensible to them. Consequently, teachers should explain the content of educational material in the above-mentioned chapters in a language accessible to elementary school pupils, explain the processes occurring in nature, taking into account the fact that 80% of pupils are of Uzbek nationality and their level of knowledge of Russian is lower than that of children of other nationalities (Russians, Tatars, Koreans, etc.). The conducted experimental work confirmed the hypothesis of our study that the effectiveness of teaching junior schoolchildren natural sciences in the conditions of digitalization will be achieved if: theoretical and methodological knowledge of elementary school teachers about pedagogical innovations will meet the requirements defined by the normative-legal documents of the Republic of Uzbekistan (GOS, the Law on Education, etc.); educational institutions have created conditions for the application of innovative technologies in the process of teaching young pupils in the field of natural sciences.

The above shows that the research goal has been achieved, i.e. the significance of innovation processes in elementary school in the conditions of digitalization has been substantiated and the model of teaching elementary school students natural sciences and program-methodological support of its implementation in practice have been developed. The effectiveness of the conducted work is confirmed by the quantitative and qualitative analysis of the results of the forming experiment, presented in the table. In our opinion, the most effective technical means of teaching 3rd grades in the subject "Natural Sciences" are a computer, interactive whiteboard with a set of interactive educational programs, musical accompaniment, etc., the teacher's explanation of the teaching material.

2. DISCUSSION OF RESULTS

In order to improve the quality of education of students in various subjects, teachers are recommended to use the activity method of teaching (founders of the system-activity approach to learning: Vygotsky, Leontiev, Elkonin, Galperin, Davydov. Davydov), while taking into account the level of children's knowledge of the Russian language.

We adhere to the point of view of [Panina \(2020\)](#) who notes that it is an urgent issue to develop a unified digital educational platform that allows us to develop common information standards, as well as mechanisms for implementing the federal state educational standards. Based on the materials of the conducted research, we have developed and scientifically substantiated recommendations for teachers and parents of elementary school students in the subject "Natural Sciences".

The results of the experimental work on the topic under study testify to the effectiveness of the developed model and program-methodological support of its implementation in practice, the existing problems in elementary school that require further research have been revealed. Comprehension of digitalization for a more successful conduct of classes during the transition "to digital", it is critical to preserve the true "analog" wealth, which is the foundation of the classical education system. Graduates will need not only digital competencies, but also fundamental knowledge, critical thinking skills, and others.

3. CONCLUSIONS

The purposeful research identifies groups of factors that explain the reasons for the penetration of information and communication technologies in education, the prospects for the impact of digital technologies on the further development of the education system as a key resource for competitiveness in the information age.

Digital school is the result of systemic transformation. The use of digital technologies in the learning process of elementary school contributes to the successful assimilation by students of educational material on the subject

and the application of acquired knowledge, skills and abilities in various types of activities (academic, extracurricular).

TRANSPARENCY:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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