Implementation of Digital Education Tools in the Pedagogical Community

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This article is devoted to solving the problem of accumulation, systematization, and translation of the practices of using digital educational technologies in municipal educational organizations. The solution to this problem was implemented by implementing the project "Organization of a system of digital education practices in the urban district of the City of Yelets" in 2022. The project was aimed at involving at least 350 managing and teaching staff, 4000 students in the active practice of using digital educational technologies in educational organizations of the urban district of Yelets (Lipetsk region, Russian Federation) by the end of 2022. To achieve the goal, the implementation of a system of digital education practices in educational organizations of the urban district of the city of Yelets was determined. Continuity and concession are key features of this system.

Consequently, the stakeholders are preschool educational organizations, public educational organizations, organizations of additional education, secondary vocational education, and higher education. This system involved the use of such organizational forms as a resource center, a municipal network platform, a pivotal school, and an author's school, within which approbation, tuning, and dissemination of the experience of using software products, the LECTA digital educational platform, the digital educational environment "Mobile e-education" and directions 3D modeling, digital video and robotics. The key results of the conducted research were quantitative and qualitative indicators. The main problem that has blocked the adoption of digital education tools among the pedagogical community is the belief that they are ineffective compared to full-time education.

Keywords: digital education, project management, actual pedagogical experience, 3D modeling, robotics, computer animation

INTRODUCTION

The results of several foresight and futurological studies carried out by authoritative organizations and scientific groups make it possible to fix one of the constants of the probable image of the future - the total digitalization of the economy, production processes, services, education, and everyday life in general[2, 5, 11].

The transformation of the labor market, which involves the release of jobs and the emergence of new ones, the creation of "new employment", is considered concrete facts determined by digitalization. The last phenomenon is due to the differentiation of the population by the watershed of digital literacy and

competence: are you an IT person or not? Even though the temporal forecasts of total digitalization are different, our children and we must prepare for this. In this context, a significant load is placed on the sphere of education[1, 3, 12].

In the national program "Digital Economy of the Russian Federation", education is given tasks at the national level - to increase the output of specialists in the digital economy and ensure universal digital literacy[13]. In this context, the leitmotif of the research activities of many theorists and practitioners of education in recent years has become the search for an answer to the question: "How to organize educational activities, successfully combining the advantages of full-time and distance education?"[4].

It is essential to study the starting situation to determine the vectors of digital transformation of the municipal education system, since educational organizations of various municipal territories have a certain experience of digital education, albeit different. In addition, schools and kindergartens do not exist in an airless space. As a rule, within a specific municipal territory, they are linked into a kind of network, interact with each other based on formal and informal ties. If there is interaction, then it must be coordinated. In the municipality of the urban district, the city of Yelets, Lipetsk region, such a coordinator of the digital transformation of the municipal education system, like many other innovative solutions, is Bunin Yelets State University (Yelets, Lipetsk region, Russian Federation).

This article describes the practice of accumulation, systematization, and translation of the experience of using digital educational technologies in educational institutions of the district, implemented within the framework of project activities, and analyzes its results.

MATERIALS AND METHODS

This article aims to study the possibilities of digitalization of education in a small city. It should be noted that the educational reality of a city with a population of up to 100 thousand people has advantages and disadvantages in solving the problem of the digitalization of education. The advantages are the presence of a university, and a high degree of manageability of educational institutions due to their small number. The disadvantages are the weak competitive environment between educational institutions, and teachers, which reduces the value of pedagogical innovations in this cultural and educational environment.

The implementation of this goal is carried out through the solution of research problems:
1. analyze the results of the input and final monitoring of the involvement of educational subjects in the active use of digital educational technologies (educational institutions, teachers, students, and their parents);
2. describe and give a qualitative assessment of the implementation of the project for the accumulation, systematization, and translation of the experience of using digital educational technologies in the educational institutions of the district;
3. to formulate practical recommendations for managing the digitalization process of education in the conditions of an urban community of up to 100 thousand people.

The methodological basis of the study is a project-oriented approach that allows you to manage educational systems with a high degree of effectiveness based on the principles of subordination of scientific and civic initiatives and the administrative resource of municipal education authorities.

The project team comprised leading and pedagogical workers of educational organizations of the district, in particular, Yelets State University named after I.A. Bunin, nine schools, six kindergartens, one institution of additional education, and specialists from the Department of Education.

The project budget was 312 thousand ruble, financed in the amount of 200 thousand rubles. Purchase of keys for the digital educational system MEO and 3D pens from extra-budgetary sources of educational organizations; financed from the local budget for 112 thousand rubles. Implementation of an additional professional training program.

The social efficiency of the project is the coverage of the population with social benefits in the amount of 4.3 thousand people.

The diagnostic tool in the study is the monitoring of the digitalization of education, developed by the authors of this article. The monitoring included the following components: the goal of managing the quality

of the digitalization of education, establishing the initial state of the controlled process, the central transitional states of the digitalization of education, and providing a feedback system. The key monitoring indicators are the material and technical equipment of the digitalization of education, as well as the formation of digital competencies of teachers and students. To diagnose digital competencies, a corresponding questionnaire was developed with elements of test items.

The study of the initial state of the digitalization process was carried out in October-December 2021. The project "Organization of a System of digital education practices in the urban district of Yelets" was implemented in 2022. The final stage of monitoring was carried out at the end of 2022.

The chi-square method was used for the statistical processing of the data.

RESULTS AND DISCUSSION

In October-December 2021, the initiative group for the digital transformation of the municipal education system monitored the educational institutions of the city district of Yelets. In total, the city district has 13 educational institutions, 30 kindergartens, and three institutions of additional education. The monitoring was attended by 387 teachers and managers in the field of general education (31.29% of the total).

Monitoring of the level of development of digital literacy and competence of teachers in the district revealed a deficit state, aggravated by the internal rejection of digital transformation of educational activities by professionals. 26.10% of respondents demonstrated a sufficient or higher level of digital literacy formation, 18.61% - a sufficient or higher level of digital literacy formation. Competence. Meanwhile, only 16.02% of teaching staff actively use digital education tools in educational activities[10].

At the same time, the monitoring revealed several successful digital practices that have taken shape in the educational space of the district. In particular, in digital educational platforms, additive technologies, distance learning, and digital video creation. However, the area covered by these practices is local and isolated[7].

Consequently, the problem of accumulation, systematization, and translation of the practices of using digital educational technologies in the educational institutions of the district was identified.

To solve this problem, the project "Organization of a System of digital education practices in the urban district of the City of Yelets" was initiated at the municipal level.

The project's goal was defined as follows: involvement of at least 350 managements and teaching staff, 4,000 students in the active practice of using digital educational technologies in educational organizations of the urban district of the city of Yelets by the end 2022. To achieve this goal, the implementation of a system of digital education practices in educational organizations of the urban district of the city of Yelets was determined.

Continuity and continuity are key features of this system. Consequently, the stakeholders are preschool educational organizations, general educational organizations, organizations of additional education, secondary vocational education, and higher education.

This system involved the use of such organizational forms as a resource center, a municipal network platform, a pivotal school, and an author's school, within the framework of which the testing, tuning, and dissemination of the experience of using software products, the LECTA digital educational platform, the MEE digital educational environment ("Mobile Electronic Education") and directions of 3D modeling, digital video, and robotics.

The result of the project was formulated as follows: a system of digital education practices was created in the urban district of the city of Yelets, which ensures the active use of digital educational technologies in educational activities by participants in educational relations in the amount of at least 300 managers and teachers, 2000 students. The users of the result are management and teaching staff, students, parents (legal representatives), and educational institutions of the urban district of the city of Yelets. The result of the project is personalized. Digital education practitioners are learners, educators, and parents. This is also the experience of digital education. The activation of digital education practices will lay the foundations for the digital transformation of the district's educational space in the future.

The main blocks of work of the project include a description of the activities of educational organizations structured according to the functions performed.

During the implementation of the project based on Bunin Yelets State University, a digital education resource center was created. The resource center possesses the necessary information, scientific and methodological, software, personnel, methodological, material, and technical resources and conditions to coordinate the digital transformation of the municipal education system. The Resource Center has developed an additional professional advanced training program for teaching staff, "The use of digital educational platforms in the school's educational process", designed for 36 hours. During its implementation, 243 teachers were covered with additional professional training.

To accumulate, systematize and broadcast the experience of using the digital educational platform LECTA, the work of flagship schools was organized. As part of the activities of these pivotal schools, 56 lessons were developed using the LECTA digital educational platform in educational activities, three practice-oriented seminars on the research problem were held for the district teachers, and methodological recommendations were developed on the use of the LECTA digital educational platform in educational activities.

A municipal network platform has been created to achieve a similar goal regarding the use of the digital educational system MEO in educational activities, combining the efforts of five schools and two kindergartens. A municipal network platform is a form of organizing the activities of two or more educational institutions for the development, testing, and implementation of methods and technologies of digital education. Teachers of municipal network sites for testing the digital educational system of the MEO in educational activities have developed 63 lessons, and 24 classes, conducted four practice-oriented seminars on the problem of research, developed methodological recommendations for using the digital educational system of MEO in the educational activities of schools and kindergartens.

In the direction of 3D modeling, a municipal network platform was also created, which united one school, one institution of additional education and two kindergartens. Participants of the municipal network sites for teachers of the district held six master classes, focused on the transfer of methodological experience in teaching students 3D modeling and teaching 3D modeling for preschoolers using 3D pens. As part of the activities of these sites is organized. The already annual student competition in 3D modeling and a competition for interdisciplinary projects using 3D modeling for students. As a result of the work of the site, an interesting product was obtained - a collection of cases of educational, developmental situations using 3D pens for children 6-7 years old. The case includes 30 educational development situations using 3D pens on six topics.

The Municipal Digital Video Networking Platform united one school and two kindergartens. During the work of the site, master classes were given on organizing joint activities of a teacher with children in an animation studio to create digital video, a competition was held to create digital video, and guidelines were developed.

At the beginning of the project, 62 teachers from nine schools, six kindergartens, one additional education institution were identified in the urban district of the city of Yelets, who actively use digital educational technologies in educational activities (9.89% of the total; 627 teachers in total). According to the project's goal, it was planned to involve at least 300 teachers in actively using these technologies. As a result of the project, the number of this group increased to 312 teachers (49.76% of the total).

Also, at the beginning of the project, 1211 students were identified who actively use digital educational platforms for educational purposes (28.72% of the total; total 4217 students). As a rule, these were school students. This group's share of kindergarten pupils is insignificant (57 pupils). The target was to involve at least 2,000 students in digital education. At the end of the project, 2,673 students were identified (63.39% of the total).

The assessment of the levels of formation of digital competencies of pedagogical workers and students before and after the implementation of the project is contained in Table 1. In the group of pedagogical workers, the tested system showed the greatest efficiency among teachers of additional education. In the group of students, the most significant increase in results is noted among school students. Using the chi-square statistical method made it possible to establish the statistical significance of the recorded changes.

TABLE 1
THE LEVEL OF FORMATION OF DIGITAL COMPETENCIES OF
TEACHERS AND STUDENTS

Respondents	High level (%)		Enough level (%)		Insufficient level (%)	
	Before the project	After the project	Before the project	After the project	Before the project	After the project
Teaching staff (total); of them:	8.13%	11.32%	15.95%	38.44%	75.92%	50.24%
school teachers	8.05%	9.43%	15.40%	37.47%	76.55%	53.10%
kindergarten teachers	7.95%	13.64%	16.48%	40.91%	75.57%	45.45%
additional education teachers	12.50%	37.50%	25.00%	37.50%	62.50%	25.00%
Students (total); of them:	10.60%	17.04%	22.47%	65.26%	66.93%	17.70%
school students	13.32%	20.20%	26.98%	71.62%	59.70%	8.18%
kindergarten children	0.87%	5.74%	6.73%	42.57%	92.76%	51.69%

Source: Compiled by the authors

The key results of the conducted research were not quantitative but qualitative indicators. The main problem that has blocked the adoption of digital education tools among the pedagogical community is the belief that they are ineffective compared to full-time education. Immersion in digital education has given impetus to the transformation of the didactic experience. While stimulating the development of digital educational practices, a pool of successful samples and models was created, broadcast in the pedagogical community. The attitude towards digital education tools gradually changed, resulting in pedagogical creativity and innovation in the field of digital didactics developed. Similar results were obtained in the works of A. A. Verbitsky[14], A. N. Makarenko, L. G. Smyshlyaeva, N. N. Minaev, O. M. Zamyatina[8].

Some of the results of the work are presented in the publications of the project curators from the university, which are devoted to the problems of developing digital tools[6, 9].

Of course, we realize that this is the tip of the iceberg. However, in the pedagogical environment, the introduction of new didactics (digital didactics refers to this kind of innovation) is possible through a change in the attitude of the pedagogical community. The ideology of the project was based on the idea that it is in the pedagogical community that there are digital education practices that need to be developed. Moreover, these practices were not imposed from outside; they came from the individual and collective experience of the community itself. Each direction of the project had its leader from among the teachers.

CONCLUSION

The global challenges of our time create new needs and opportunities and require rapid changes in various aspects of the educational system. The 2020-2021 academic year for all schools and kindergartens has become exceptional in connection with the announced coronavirus pandemic. During this period, kindergartens functioned as "duty groups". In schools, not only has the curriculum changed, but also the peculiarities of the organization of educational activities: the spring break was extended to 2 weeks instead of one, visits to educational institutions were canceled, 100% of school students and teachers worked remotely, using all possible forms of e-learning. The quarantine during the pandemic showed all the pain points of the general education sphere. Observing the schools of the urban district of the city of Yelets during the forced transition to distance learning showed that the teachers and educational institutions participating in the project withstood this problematic period with dignity.

The main conclusion, which was formulated during the implementation of the project, is that to achieve a positive effect of introducing digital practices into the sphere of general education, the most important

thing is to appeal to the experience of the pedagogical community, accumulate, systematize and broadcast the practices of using digital educational technologies in educational organizations.

Of course, to enhance the effect, it is necessary to create an informal network of educational organizations that would consolidate pedagogical science and educational practice. It is essential to replicate teachers' positive experience in using digital tools in educational activities. This is achieved through scientific and methodological support, which is in the competence of the resource center. The replication of successful digital education practices depends on creating specific methodological and technological products, their targeted advertising in the pedagogical community, and ultimately on creating a scientific and methodological school. An essential condition for the effectiveness of these practices is close cooperation on an informal basis with developers of software products for education, support, and stimulation of successful digital education practices at the level of school administration and the municipality. Ultimately, creating a highly competitive environment in the digitalization of education at the level of teachers and schoolchildren significantly promotes this area of pedagogical and technological innovation.

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