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# The Use of Digital Learning Resources in the Implementation of Individual Educational Route of Primary School Students

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## Abstract

The relevance of the problem under study is due to the necessity for development of methodological and technological approaches to the use of digital technologies in the primary school educational process. This article will address the problem of the use of digital learning resources in the implementation of individual educational route of primary school students.

The purpose of the study is to consider the possibilities of using digital educational resources at different stages of the implementation of individual educational route of primary school students. The article defines the pedagogical conditions that ensure the effectiveness of the use of digital educational resources in the implementation of individual routes of elementary school students, analyzes the educational websites used by teachers of the Republic of Tatarstan in teaching younger students, and reveals the requirements for choosing digital educational resources.

In the course of the research the following methods were used: experimental methods (ascertaining experiment and experimental training); theoretical analysis; quantitative and qualitative analysis of the obtained results, questionnaire method for collecting empirical data at the stage of ascertaining experiment. The leading research method was pedagogical experiment, in which 70 teachers (questionnaires) and 26 primary school students took part.

Results: It has been established that the use of digital educational resources in the implementation of an individual educational route increases the efficiency of its completion, forms and develops not only students' subject skills, but also increases their motivation, improves their computer literacy, and promotes the development of educational independence. Our study also actualizes the problem of the formation of basic competencies in primary school teachers in terms of the use of digital educational resources in their professional activities.

The results of the study can be used in the design and implementation of individual educational routes of primary schoolchildren using digital educational resources to improve the quality and effectiveness of their training.

The issues of the effective use of digital technologies in the implementation of individual educational routes of primary schoolchildren have not yet been the subject of special consideration. The described pedagogical conditions for their effective use in this function will allow to make the individual educational route even more individualized and effective.

*Keywords:* individual educational route, digital learning resources, elementary school children, elementary school.

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## **Introduction**

The necessity to unite digital technologies and individual educational route in the study is dictated by the tasks of the Federal State Educational Standard of Primary General Education which is implemented in Russia today (FSES PGE). It contains not only subject, but also meta-subject results of mastering the basic educational program. Among them, the ability to use the means of information and communication technologies to solve communicative and cognitive tasks, the ability to work with information presented in the open educational information space of the Internet, etc. The methodological basis of the standard is a system-activity approach which involves transferring of the student to the position of active subject of educational activity. The individual educational route, representing a purposefully designed individualized education program, provides the position of a subject of educational activity, contributes to the formation of their self-education on the basis of psychological and pedagogical support of their choice in self-realization (Sagitova, 2016). Bulgarian researcher Lazarov (2012) emphasizes that an individual educational route enables optimal development of the student's creativity.

## **Purpose and objectives of the study**

The purpose of the study is to determine pedagogical conditions which ensure the effectiveness of the use of digital educational resources in the implementation of individual routes of younger students.

## **Literature review**

The digitalization of education is rapidly developing in modern Russia and is supported by the government and by the public in general. The introduction of digital technology occurs at all levels of education, including elementary school. National researchers associate the development of digital educational environment with the solution of problems connected to the improvement of educational practice effectiveness. It is proved that digital technologies have a positive impact on teaching and learning in schools (Voogt et al., 2013), on teaching quality improvement, for example, when using a series of digital games in teaching mathematics to elementary school children (Fokides, 2018), on improvement and implementation of new teaching and learning processes (Bilbao-Osorio & Pedró, 2009). The factors influencing the ideas of primary and secondary school teachers about the benefits of using digital technologies in their teaching practice are identified (Badia et al., 2014). In the report, published by European Commission, revealed strategic approaches to digital education across Europe with specific reference to policies supporting schools. Authors also highlight, that in primary education, more than half of the European education systems include digital competence as a cross-curricular theme (European Commission/EACEA/Eurydice, 2019).

In Russian studies, the problem of the use of digital technologies in primary schools is regarded in many aspects: ensuring children's safety in the digital educational environment (Aleksandrova, 2018), the impact of the digital environment on student performance in elementary schools (Karpova, 2019), developed a methodology for the formation of the readiness of future primary school teachers to use digital educational resources, taking into account the characteristics of the professional activity of an elementary school teacher digital educational resources (Baklanova, 2013), the professional competence of primary school teachers as specialists in the field of digital learning resources (Baklanova, 2015), the electronic educational resources themselves are considered from the point of view of didactic requirements for them (Molotkova et al., 2011), and the didactic potential incorporated in them (Belousova & Olefirenko, 2013), etc.

At the same time, the study of scientific and pedagogical literature and the practice of using digital technologies in elementary schools revealed a contradiction between the didactic capabilities of digital learning resources and the insufficient development of methodological and technological approaches to their use in the educational process of primary schools. This article will address the problem of the use of digital learning resources in the implementation of individual educational route of primary school students. Issues of the effective use of digital technologies in the implementation of individual educational routes of primary schoolchildren are not researched at the theoretical and methodological levels.

## **Methodology**

### *Research methods*

In the research process, the following methods were used: experimental methods (ascertaining experiment and experimental training); analytical methods (theoretical analysis of pedagogical, psychological, methodological literature on the issues under study); quantitative and qualitative analysis of the obtained results, a questionnaire method for collecting empirical data at the stage of ascertaining experiment.

### *Experimental facility of the research*

The experimental facility of the research was MBGEI "General Secondary School No. 132 with Advanced Study of Foreign Languages" in the Novo-Savinovsky District of Kazan.

### *Research Stages*

Analysis of the use of digital resources by primary school teachers. At the first stage of the study, we identified and analysed the most popular digital educational resources which primary school teachers in the Republic of Tatarstan use to implement the individual routes of primary school students (70 teachers

participated in the questionnaire). We have allocated a total of nine educational resources that have been identified in teacher profiles more than once. These were educational websites, which we divided into two categories according to user orientation. Digital learning resources targeted only at teachers, giving them an opportunity to engage in self-education and professional self-development; find necessary materials (class notes, additional materials on the topic, etc.), share the results of their activities, including innovation, participate in discussions, workshops, seminars. A significant drawback that reduces the demand for such websites is the spontaneous development of some of them, the lack of quality control presented on separate platforms of materials, as well as the inconvenience of the interface (for example, the lack of a centralized search on the website). The second group consisted of websites targeted at both teachers and students with a simulator function. We analyzed all educational platforms named by teachers according to the following criteria: compliance with the Federal State Educational Standard; quality of subject content (on the example of the discipline “Russian language”); resource availability; convenience of the interface; resource filling with content.

The analysis highlighted three main factors that determine the effectiveness of the use of digital learning resources in the implementation of individual educational routes: 1) high quality of the materials presented on the platform, 2) filling with content: a diverse format of the resources presented on the platforms (from electronic textbooks and video lessons to game, creative platforms; unusual, creative tasks, differentiated by level of difficulty; electronic magazine; competitive elements; automatic selection of personal tasks based on effectiveness, i.e. the ability to build an individual educational trajectory, etc.), 3) an intuitive and conceptual interface.

It should also be noted that some educational interactive platforms differed in all of the above characteristics, but were not used so actively by teachers just because the teachers did not have enough information about them.

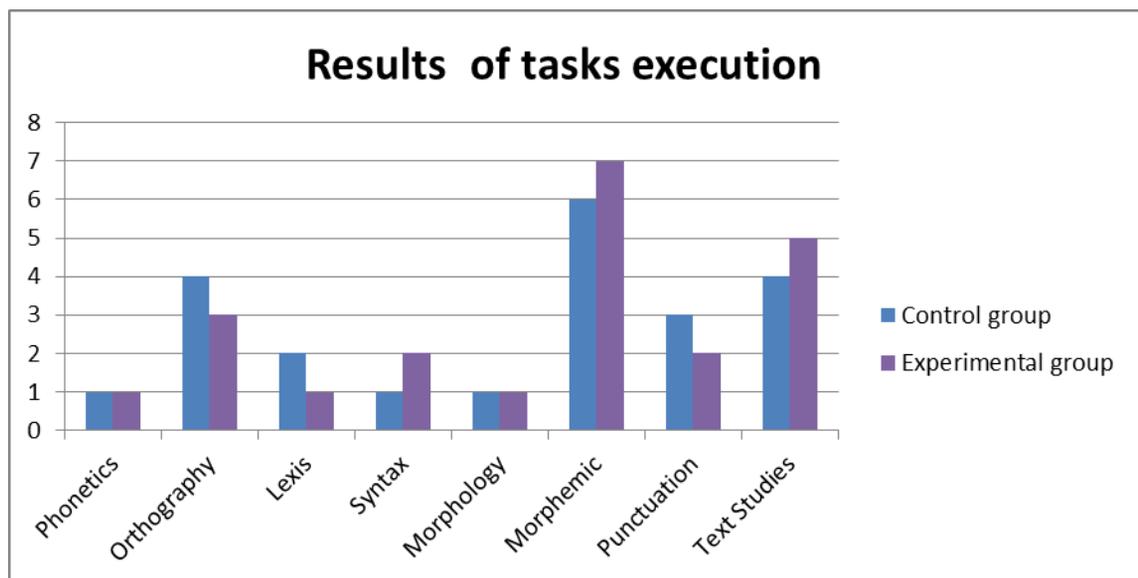
Thus, this indicates the necessity for primary school teachers form basic competencies in the use of digital learning resources in their professional activities, namely, the skills to search for digital learning resources from various sources: CD-ROMs, educational Internet servers, from their colleagues, and also using email from teachers from other schools or regions.

Implementation of individual educational route. The experiment was conducted among fourth-grade students in the framework of the subject “Native Russian Language”. The school discipline “Russian language” is difficult for many students, and they extremely rarely define it as their favorite school subject. Creating an individual educational route will allow students to be protected from possible knowledge gaps,

“level” their training, and arouse interest in learning the Russian language. “Native Russian language” is an elective course, and it explains a relatively small number of students in classes: 13 students in the experimental class and the same number in the control one. In both classes the technology of individual educational route was used. In the experimental class, learning was organized with the use of digital learning resources.

The implementation of the individual educational route was conducted in four stages: diagnostic, design, implementation and analytical.

At the diagnostic stage, we identified difficulties in learning the Russian language which younger schoolchildren who participated in the experiment. The students had a comprehensive test on the main topics of the course. Moreover, it was important for us to establish a correspondence between an objective assessment (based on the results of a comprehensive test) and the subjective perception of a child’s own difficulties in studying certain topics of the course (survey results). Figure 1 shows the results of the comprehensive test in the Russian language.



**Figure 1.** Difficulties of primary schoolchildren

The data obtained shows that sections “Morphemic”, “Text Studies” and “Orthography” cause the greatest difficulties for younger students.

Figure 2 shows the most poorly mastered topics of the course “Russian language”, identified by the students themselves during the survey.



**Figure 2.** Results of primary school students' survey

The data obtained demonstrates that students gave a completely adequate assessment of their knowledge. Since the implementation of individual educational route assumes that the student will be a subject of modelling their own individual educational route, it is necessary that they have formed reflective skills, including the ability to carry out self-assessment.

In order to make the work on an individual educational route more effective, it is necessary to take into account the motivational aspect. To determine the characteristics of academic motivation of primary schoolchildren, we used projective technique by Elfimova (1991). This technique reveals the features of academic motivation through student's attitude to the basic concepts of educational process (school, class, student, teacher, lesson) from the perspective of "good - bad". The following results were obtained. For most students, a good classroom is one with a lot of visual materials and which is quiet during the lesson (92%). A good student is one who listens carefully to the teacher (87%), and a good teacher is the one who can explain the material in simple words (96%). For students it is important that the teacher could explain the topic and the student is ready to listen to it, but they are not ready at all to find the necessary information without assistance. And the question "good and bad answer" primary school students associate only with a mark "5" or "2".

Thus, the features of the academic motivation of younger students include a shift in emphasis on the external side of educational process and the prevailing orientation on teacher's assessment of their educational activities.

Based on the data obtained, the following stages of designing and implementing individual educational routes for students were built, and digital educational resources were selected. It was important for a teacher to develop a system of educational choices and take the position of an accompanying tutor.

In the experimental class the use of digital technologies at the implementation stage of the individual educational route was as follows. In order for the student to find necessary educational material and study it individually, we used the digital learning resource "Electronic School Portfolio", which contains textbooks by different authors of different educational and methodological complexes. It is known that each child perceives information in his/her own way, and we gave him/her an opportunity to choose a textbook, grade (the topic could have been studied in previous grades), where the educational material is presented in an optimal for the student way. According to our observations, often the presentation of theoretical material in the online textbook chosen by a student was almost no different from the textbook which the student worked with in class, but nevertheless for him/her it seemed that the topic was explained more clearly.

In addition, we used interactive platforms that provide children with video lessons on the main topics of the course. For younger schoolchildren it is important to include fairy-tale characters in the interactive classes on the platform. These characters not only entertain schoolchildren, but also help them to master theoretical material. For example, when looking at the Phonetics fairy, children mark its large ears and a large mouth (we pronounce and hear sounds), and the Graphic fairy's mouth is tightly closed, her ears are small, and there is a large feather in her hand (we write and see letters). This allows children, on the basis of the presented images, to consolidate the difference not only between the two sections of the Russian language, but also between their main units - sound and letter.

Also, for more information, which expands and deepens the students' knowledge, we recommended primary school children to use informative and encyclopaedic digital learning resources (virtual libraries, online dictionaries, children's encyclopaedias, reference books).

At the next stage, we used digital resources with a simulator function. It was important that the tasks of the interactive educational platform were differentiated by the level of complexity. In addition, at this stage, we tried to offer assignments with no direct assessment (if you failed - try again). This made it possible for the student to master new methods of action, working according to the scheme: theory – revision – example, only then they could try to complete the task again.

All students of the experimental class were not only able to independently understand the topic and do practice exercises, but were also encouraged by the results.

At the stage of developing new ways of action, we used several educational interactive platforms which contained a variety of tasks, tests, multimedia didactic games and quizzes. This made it possible to make the learning process as individualized, vivid and interesting for children as possible. It also contributed to the formation of positive motivation among students and the development of their cognitive activity. For the teacher at this stage, it was important to be able to track children's progress (which assignments they chose, how many attempts they made, how much time it took). Modern educational platforms give this opportunity to a teacher. A teacher not only participates in the design of the route, but also conducts pedagogical observation, if necessary, together with a student, corrects the route. The task designer function turned out to be effective by allowing a teacher to compose individual tasks for particular students. Some interactive platforms offer children to join a competition (who is more active, who is better, etc.), children could see their results relatively to the results of other children, and which was an additional incentive for active learning. On the other platforms only the teacher could see the rating, built by the system and then award the winning students.

Also, in the lessons teachers actively used CDs with electronic applications for textbooks with a large amount of multimedia resources (animations, video clips, interactive games, tests, photographs, etc.). Nowadays, each set of textbooks on Russian language for elementary school is equipped with such disks.

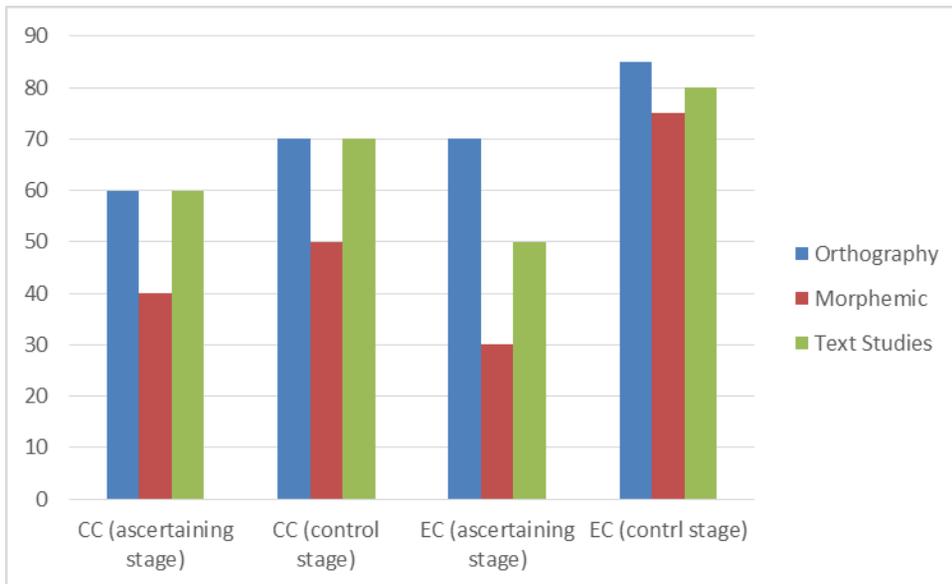
At the analytical stage of individual educational route, the students together with the teacher analyzed and evaluated the work they had done, identified typical mistakes and gaps. Further, when designing an individual route on other topics, we suggested students to choose digital resources on their own. This contributed to the development of the skill to self-design an educational route.

Discussions with students of the experimental group allowed us to determine that the use of digital learning resources in the implementation of individual educational route not only increases the level of independence and motivation for learning, but also forms an important competency - computer literacy.

As a result, students became acquainted with various digital educational platforms, learned how to use different digital learning resources to fill in the knowledge gaps, consolidate a studied topic, and learn something new that is not included in the school curriculum.

## Results

At the control stage of the experiment, we gave students an online test. In this article, we present the results of individual educational routes on three topics of the course (orthography, morphemic, text studies), which we identified as the most poorly mastered (Fig. 3).



**Figure 3.** Dynamics of mastering difficult topics of the course by the control class (CC) and the experimental class (EC)

Positive dynamics is observed in two classes, however, the younger students of the experimental class, where the implementation of the individual educational route was carried out using digital educational resources, coped with the tasks much better than students in the control class.

We also studied students' motivation once more. The level of motivation for learning in the experimental class had increased noticeably. Now, students put more emphasis on self-assessment of their educational activities and noted that the best lesson was "when digital technologies are used". If at the ascertaining stage, younger schoolchildren found it difficult to answer the third question of the questionnaire: "what, in your opinion, are the reasons for the difficulties in learning the Russian language?" After the experimental training, the students gave substantive answers, noting among the main reasons the uniformity of the learning process and a lack of interest in the topic they studied. It is known that one of the problems of organizing the educational process in elementary grades is rapid fatigue of schoolchildren, the forthcoming development of protective inhibition in conditions of monotonous work. Digital learning resources contain

reserves for solving this problem, not only due to the variety of tasks (including tasks that ensure a smooth transition from game activity to educational), but also the impact on student's channels of information perception.

According to our observations, younger students are happy that, owing to digital resources, they are no longer dependent on school, can feel more adult and independent, conscious in the process of obtaining knowledge.

We had a conversation with the parents of the experimental class. They noted that their children had become more independent, began to take the initiative in doing their homework. Parents were pleased that their children saw the educational component in computer technology, and even expressed a wish to use digital resources in the classroom and, if necessary, to give homework on online platforms.

The results of the study show that digital learning resources are a productive tool in the implementation of individual educational route. Design and implementation of it with the use of digital resources helps students not only plan education activities, maintain and improve their knowledge and skills in subjects, but also develop educational skills and abilities, become competitive in the changing digital globalized society.

Our research allows us to determine that the use of digital learning resources in the implementation of individual educational route of primary schoolchildren will be effective if the following pedagogical conditions are met:

- an elementary school teacher must have professional competence in the use of digital learning resources in their professional activity;
- to carry out didactically rational integration of digital educational resources with traditional teaching techniques;
- the choice of digital learning resources will be based on the informative completeness and variety of content, cognitive capabilities of resources, user-friendly interface;
- will take into account individual characteristics and the level of elementary school students' subject knowledge in the process of using digital educational resources;
- to stimulate the cognitive and creative activity of primary schoolchildren by means of various types of digital learning resources;

- The organization of educational activity of elementary schoolchildren in the classroom using digital resources should be based on health-saving technologies.

### **Discussions**

Unique features of virtual information environment determine an undeniable effectiveness of its use in any sphere of human life. Today, the questions of using the properties of the virtual environment in modern educational practice, the productivity of their influence on the processes of training, education and development of a child remain open.

We are aware that our study was conducted on a limited number of trainees: 26 primary school students. However, we plan to continue our work in the search for answers to relevant questions for modern education which is now in the process of digital transformation.

It should also be noted that the results of the study actualize the problem of forming primary school teachers' competence in the use of digital educational resources in the educational process of primary schools.

### **Conclusion**

It has been established that the use of digital learning resources in the implementation of individual educational route increases the efficiency of the course, forms and develops not only students' subject skills, but also increases their motivation, improves their computer literacy, and promotes the development of educational independence, creative and cognitive activity.

The use of digital technologies requires the teacher to have a certain level of professional competence in the use of digital learning resources in their professional activity. Before recommending any digital resource to younger students as a tool for studying a topic, a teacher has to identify personally the strengths and weaknesses of the resource. For example, the amount of tasks on the topics of the course varies on different interactive educational platforms. On one platform there may be more specific tasks on a particular topic, on the other - less. So, the formation of orthographic vigilance on one platform turned out to be 33% of all orthographic tasks, and on the other was only 4%. Therefore, a modern primary school teacher is faced with the task not only to find digital learning resources, but to classify, analyze and use them didactically efficient. The teacher needs skills to manage the learning activities of younger schoolchildren: correctly explain the idea and goals of learning activity using digital learning resources, provide students with safe computer experience, organize their communication activities, correctly distribute the attention of

schoolchildren and maintain its stability, have an individual approach to students, etc. The use of digital learning resources in the implementation of individual route of primary schoolchildren provides several advantages. It facilitates the study of new theoretical material and expands the variety of ways of presenting information by affecting on audio and emotional memories, etc. It allows to take into account student's potential, the level of his/her knowledge, needs. It performs the functions of variability and differentiation of learning. It gives younger students an opportunity to self-test and self-assess themselves at all stages of the route. Digital resources serve as a consultant and assistant by providing a large number of revisions, tips, explanations.

Digital learning resources are not only new educational opportunities, but also new skills. Students have an opportunity to use other materials to prepare for the lesson and to self-study. The educational process using digital educational resources changes students. The results of the process are observed in educational and personal achievements of students. We not only introduce younger students to information technology, but also demonstrate them a possibility of using a computer and the Internet for self-education and self-development.

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