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## Application of Blended Learning Models in Teaching Physical Education in School As a Condition for Transformation of the Educational System

Elena M. Golikova, Petr P. Tissen\*,  
Rishat R. Kalimullin  
*Orenburg State Pedagogical University  
Orenburg, Russian Federation*

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**Abstract.** The strategic direction of the modern education system is digital transformation. The procedure for the use of electronic educational resources is reflected in the regulatory documents, as well as the concept of teaching the subject “Physical Education”. The above necessitates the justification of the methodology of teaching physical education in a general education organization, with the implementation of the blended learning model, taking into account the optimal combination of the “strengths” of traditional education (practice-oriented format) using digital resources and platforms for mastering theoretical material, control, self-analysis of the acquired knowledge in the process of studying. In the course of the study, a work program for basic general education (grades 5–9) was developed using remote information technologies in the blended learning mode. In the educational practice of the subject “Physical Education”, the models of blended learning “flipped class” and “station rotation” are introduced. The results of the experimental work showed positive dynamics and the possibility of implementing blended learning in the process of the lesson “Physical Education”.

**Keywords:** physical education, blended learning, students.

Research area: theory and methodology of physical education, sport training, recreational and adapted physical education

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## Применение моделей смешанного обучения в преподавании физической культуры в школе как условие трансформации системы образования

Е.М. Голикова, П.П. Тиссен, Р.Р. Калимуллин

Оренбургский государственный педагогический университет  
Российская Федерация, Оренбург

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**Аннотация.** Стратегическим направлением современной системы образования является цифровая трансформация. Порядок применения электронно-образовательных ресурсов отражен в нормативных документах, а также концепции преподавания учебного предмета «Физическая культура», что обуславливает необходимость обоснования методики преподавания физической культуры в общеобразовательной организации с учётом реализации модели смешанного обучения при оптимальном сочетании «сильных» сторон традиционного обучения (практико-ориентированный формат) с применением цифровых ресурсов и платформ для освоения теоретического материала, контроля, самоанализа полученных знаний в процессе обучения. В ходе исследования подготовлена рабочая программа основного общего образования (5–9 классы) с использованием информационных технологий в режиме смешанного обучения. В образовательную практику предмета «Физическая культуры» внедрены модели смешанного обучения «перевернутый класс» и «ротация станций». Результаты экспериментальной работы показали положительную динамику и возможность реализации смешанного обучения на уроках по физической культуре.

**Ключевые слова:** физическая культура, смешанное обучение, обучающиеся.

Научная специальность: 5.8.4. – физическая культура и профессиональная физическая подготовка.

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**Introduction.** The year 2021 is a turning point in terms of approving the strategic direction of the digital transformation of education, aimed at creating conditions for the functioning of the electronic information and educational environment. The strategic direction covers all levels of general education and involves the introduction of promising technologies (Magomedov, 2012). The role of artificial intelligence in education, both advisory and support systems (information-electronic educational resources), promising methods and technologies, including cloud

ones, which improve the quality of data, has been determined (Andreeva, 2016). Updating the planned educational resources (content, evaluation of the results achieved) is associated with the processes of informatization of society and the transformation of information into the most important social resource, the emergence in the process of communication of participants in the educational process of a special virtual reality that complements the realities of the education system, which actualizes the need to introduce blended learning models into practice in the methodology of teaching physical education.

**The purpose of the study** is to evaluate the effectiveness of the introduction of blended learning models into the methodology of teaching physical education in a general education organization.

**Methods and organization of the study.**

The study was carried out under the project “Methodology of teaching physical education in a general education organization with the implementation of a blended learning model”, which is being implemented with the financial support of the Ministry of Education of the Russian Federation as part of the state task (additional agreements No. 073–0302021–044/2 dated June 21, 2021 to agreement No. 073–0302021–044 dated January 18, 2021).

The methodology of teaching physical education in a general education organization, taking into account the implementation of the blended learning model as a socially significant result of the educational policy of society and the state, is updated in the course of the analysis of the fundamental regulatory documents (Strategy for the Development of the Information Society in the Russian Federation for 2017–2030; Federal Law on Education in the Russian Federation; National project “Education” – the federal project “Digital Educational Environment”; Federal State Educational Standards for Primary, Basic and Secondary General Education; SanPiN (Sanitary Norms and Rules); Order of the Ministry of Education and Science of the Russian Federation “On approval of the Procedure for the Use of e-learning, distance learning technologies by Organizations Engaged in Educational Activities in the Implementation of educational programs”; Concepts of teaching the subject “Physical Education” in educational institutions of the Russian Federation that implement the main external general education programs; Federal Law “On Physical Education and Sports in the Russian Federation”).

The need to update the methodology of teaching physical education in a general education organization is due to:

– on the one hand, the low efficiency of the educational process in physical education (using authoritarian-traditional forms of work) and the fragmentary involvement of electronic educational resources with their po-

tentially new didactic capabilities; the lack of a motivational-positive attitude towards physical education and sports activities among the majority of schoolchildren (Kraynik, 2007); insufficient value significance for a large part of schoolchildren of health and healthy lifestyle skills (Balsevich, 2002; Lubysheva, 2016); the lack of an individual approach, age and typological adequacy of pedagogical influences on the physical development and physical fitness of students in accordance with federal state educational standards; insufficient use of the updated personal characteristics of generation Z (digital generation, aimed at the use of digital tools and technologies: tablets, mobile phones, specialized ICT technologies, etc.) (Lyubivaya, 2015);

– on the other hand, the fact that in the Concept of teaching the subject “Physical Education” in educational institutions of the Russian Federation that implement the main general educational programs, attention is focused on the priority of harmonious use of traditional forms of work and expanding the base of electronic educational resources (the basis of blended learning, called “hybrid learning”, “mixed learning”), necessary for the implementation of educational programs, updated didactic and technological tools for the activities of students and teachers (Medvedeva, 2015; Nikitina, 2013).

The importance of updating the methodology of teaching physical education in a general education organization with the implementation of the blended learning model is also updated in the context of the deteriorating epidemiological situation, the spread of a new coronavirus infection (1.3 billion children in the world in the spring of 2020 were in self-isolation and did not attend school), violating existing educational relations, and dictating new, not always favorable and even harmful, rules of life (didactogeny, physical inactivity, irrational daily routine, etc.), the emergence of risks for the health and life of students that affect the psychosomatic state of schoolchildren (in 83.8 %, unfavorable mental reactions of the borderline level were noted, a sharp decrease in the health indicators of subjects who are in limited conditions of life and activity), reduc-

ing the working capacity and physical fitness of students to fulfill educational tasks and achieve the quality of education.

V. R. Kuchma, M. A. Polenova, I. K. Rapoport, A. S. Sedova, S. B. Sokolova, M. I. Stepanova, V. V. Chubarovsky found that the modern school does not have safe online learning technologies, including electronic devices for delivering educational information, taking into account the age and health of schoolchildren (Kuchma et al., 2020). In this regard, the role of the implementation of the model of blended learning (creative integration and the optimal ratio of offline realities of practical physical education classes and theoretical educational activities that complement them online) in the teaching of physical education is increasing, taking into account the optimal regulation of traditional and distance education (in order to level or mutually compensate for the shortcomings of each of them) and the development of software and methodological means for the safe transmission of information and the development of physical fitness of students, the development of a stable interest in regular physical education and sports activities, in order to reduce the risk of health problems for all participants in educational relations.

Substantiation of the methodology of teaching physical education, with the implementation of the blended learning model from the standpoint of a safe combination online (the theoretical aspect of expanding knowledge about the preservation and development of health, physical fitness in terms of physical, mental and social vectors) and offline (practical development of physical qualities, motor abilities, improvement of all types of physical education and sports activities) of learning, provides students with the acquisition of skills and abilities of self-organization, self-management by physical improvement with an independent choice of the educational route, time, place and pace of learning to achieve educational and life success (Golikova et al., 2021; Moskvina, 2020).

The possibilities of using blended learning in the process of mastering physical education as a method that combines traditional learning and elements of distance learning should be

considered in other directions (Mishota, 2012). It makes it possible to cover all students (up to 100 %), regardless of the nosological group of diseases, allows us to study some topics related to theoretical knowledge of the development of motor actions and in more depth than only in a physical education lesson. The use of computer technologies based on various digital platforms makes it possible to increase the interest of students in the educational process and approach each of them more individually (Golikova, 2021).

The foregoing necessitates a holistic substantiation of the methodology of teaching physical education in a general education organization with the implementation of a blended learning model that fully and comprehensively reveals: content characteristics, semantic guidelines and activity concepts of the optimal combination of the “strengths” of traditional education (practice-oriented real-time format) with advantages remote technologies within the framework of the development of theoretical material on physical education, the consolidation of physical education and health-improving work in the formation of the body-spiritual and social health of students; ideological constructs, methods of updated teaching of physical education in a general education organization with elements of blended learning; phenomenon under study; process model of the studied phenomenon; the author’s technology of formation of individual educational trajectories of physical self-development and self-improvement of students in the framework of teaching physical education in a general education organization based on blended learning.

It should be stated that, despite the extensive aspect of interdisciplinary literature on the problem of research, the integral problem of substantiating the methodology of teaching physical education in a general educational organization with the implementation of the blended learning model was not the subject of special consideration.

As part of the study in 2021–2022 a pedagogical experiment was carried out in educational organizations, the models of blended learning called “flipped class” and “station rotation” were

introduced in the fifth and sixth grades. The “flipped classroom” model was applied in the fifth grades (100 students) in 2021, the “station rotation” model was applied in the sixth grades (98 students) in 2022. During the study, the following research methods were implemented: analysis of the problem under study, study of legal documents in the field of physical education of people with disabilities, empirical research methods (observation, conversations, experiment, control and measurement, evaluation).

Blended learning was implemented according to the developed organizational and methodological model, which includes: a methodological and organizational block (approaches, principles, patterns, semantic guidelines and ideological constructs); content-activity block (stages and conditions for the implementation of blended learning, technological directions); reflexive-evaluative (software and

educational and methodological support, criteria, indicators, diagnostic tools for achieving educational results in the subject “Physical Education”) (Akimova et al., 2022). In the course of the study, a program on physical education for students in grades 5–9 was developed, including a section with recommended electronic educational resources and platforms for use in blended learning. For each section of the program with the content of the topic, in accordance with the Federal State Educational Standard of basic general education, electronic (digital) educational resources were selected (Tissen, 2021). The program allows students to study topics related to theoretical training in more depth, the use of digital technologies increases interest in the educational process in an individual mode of development, and the physical education teacher organizes the educational process more effectively (Table 1).

Table 1. Calendar-thematic plan for mastering the content of the program (Grade 6) (excerpt)

№	Name of sections and topics	The content of education in accordance with the main educational program of basic general education	Electronic (digital) educational resources
<b>Basic Tutorials</b>			
<b>Vilensky M. Ya.</b> Physical Education. Grades 5–7: a textbook for students of general education. institutions./ M. Ya. Vilensky, I.M. – <a href="http://school521.ru/Physical%20education%205–7%20kl.pdf">http://school521.ru/Physical%20education%205–7%20kl.pdf</a> <b>Matveev A. P.</b> Physical Education. Grades 6–7: textbook. for general organizations / A. P. Matveev.– 9th ed. – M.: Education, 2019.– 192 p.: ill. <a href="https://fk12.ru/books/fizicheskaya-kultura-6–7-klassy-matveev">https://fk12.ru/books/fizicheskaya-kultura-6–7-klassy-matveev</a>			
<b>1 quarter (27 lessons)</b>			
1	Section 1.1. “Knowledge about physical education”. Topic: Physical education in basic school	The content of physical education in the 6th grade. Basic requirements for mastering the content of physical education. Substantiation and choice of types of physical activity for the variable part. Standards of physical fitness in the 6th grade.	<b>Norms of physical fitness.</b> <a href="https://resh.edu.ru/subject/lesson/7136/start/261643/">https://resh.edu.ru/subject/lesson/7136/start/261643/</a>
2	Section 1.3. Physical improvement. Subject: Athletics.	Introductory briefing on safety requirements during Athletics classes. Organization of leisure by means of physical education. High start technique and starting run. Compliance with the standard – running 1000 meters	<b>Safety requirements briefing</b> <a href="https://nsportal.ru/shkola/raznoe/library/2019/12/23/instruktsiya-po-tehnike-bezopasnosti-uchashchih-sya-pri-zanyatiyah-v">https://nsportal.ru/shkola/raznoe/library/2019/12/23/instruktsiya-po-tehnike-bezopasnosti-uchashchih-sya-pri-zanyatiyah-v</a> <b>High start technique and starting run:</b> 1. <a href="https://zen.yandex.ru/media/id/5ad5cae53dceb73c33c3a7c7/tehnika-vysokogo-starta-niuansy-fishki-i-sekrety-5aeae14db0cd9e28f7a46be">https://zen.yandex.ru/media/id/5ad5cae53dceb73c33c3a7c7/tehnika-vysokogo-starta-niuansy-fishki-i-sekrety-5aeae14db0cd9e28f7a46be</a> 2. <a href="https://resh.edu.ru/subject/lesson/3212/main/">https://resh.edu.ru/subject/lesson/3212/main/</a>

## Results and its discussion

In the course of the study and implementation in educational practice of the developed program of basic education (grades 5–9) using distance information technologies in the blended learning mode for students in the fifth and sixth grades using the “flipped class” (grade 5) and “station rotation” models (Grade 6), positive results were noted in the studied evaluation criteria. As diagnostic tools for achieving educational results in the subject “Physical Education” such criteria as the knowledge component, activity and independence of students were taken. The criteria of the formation of knowledge include indicators of completeness and strength. The indicators of the components of students’ self-sufficiency and activity in the course of mastering the subject were also evaluated, the results of an expert assessment and testing (18 questions) of the personal assessment of students were taken as a basis. According to the results of each student, the degree of formation of the studied indicators was monitored. The scale of levels of knowledge, independence and activity was determined by intervals (level) in points (0–1 low, 2–3 medium, 4 high). All results were converted into points, which made it possible to determine the qualitative and quantitative changes in the study groups.

In the fifth grade the “flipped classroom” model was applied, it combined online and offline learning. The model is focused on the acquisition by students of the skills and abilities of self-organization, self-management by physical improvement, it allows to study in depth topics related to human motor abilities. The flipped classroom is one of the simplest blended learning models in organizational terms, which confirms its ability to be applied in the fifth grade. That is, class homework is swapped (Pankratovich, Akimova, 2021). At home, the child is supposed to learn the material or repeat what he has learned using digital resources and platforms. Organizing such kind of work, the teacher, when planning his activities thematically, provides a list of educational and methodological materials for each section of the program and the topic of the lesson that the student can use (addresses for the possible use

of Internet platforms, multimedia programs, electronic textbooks and problem books, game programs, etc.). Thus, such an obligatory element as a display, a show is forced out of the lesson of physical education. It is replaced by homework: watching a video, analyzing various information resources (listening to mini lectures, watching presentations with teacher’s comments, a fragment of an educational film selected by the teacher for this topic, reading reference and information resources, etc.).

At the lesson, the teacher, first of all, should find out what problems the students had in the course of doing homework. This can be done through a survey, conversation, assignments, tests, or homework (for example, in VK, Moodle). Based on the data obtained, the teacher can determine the readiness of students “here and now” to work on the proposed topic and adjust the tasks and the way they are performed (frontally, differentiated, individually). In the gym, practical work is organized to develop the skills of applying the theoretical material studied at home, which can be carried out using interactive technologies (problem-based learning, game technologies, etc.), which contribute to the activation of search, research, creative activity, and the development of collective interaction skills.

As a result of the study, the results of the main (50 people) and control (50 people) groups are in the zone of significance at  $U_{cr} - 912$ , while there is a significant difference between the groups, in terms of the knowledge component, the results increased by 21 %, indicators of independence and activity expert evaluation increased by 21 %, self-assessment testing of indicators of activity and independence when performing tasks increased by 18 %. (Table 2).

Homework with the use of digital resources made it possible to provide meaningful preparation for fifth grade students for subsequent work in the classroom, and, in addition, to realize their difficulties and the possibilities of their resolution, which makes it possible to develop their own learning strategy, to be responsible and independent in this process, and not to shift the responsibility to the teacher (parents) “to force oneself to study”.

Table 2. The results of the formation of knowledge, independence and activity of 5th grade students in the subject "Physical Education" when introducing the "flipped class" model

Indicators	Groups		M±σ	U <sub>emp</sub>	Δ%
Formation of knowledge on the subject	Main	before	1,7±1,2	588	21
		after	2,9±1,1*(**)		
	Cont.	before	1,6±1,0	786.5	
		after	2,3±0,6*		
Expert assessment of independence and activity	Main	before	1,7±1,1	604	21
		after	2,8±1,1*(**)		
	Cont.	before	1,7±1,1	881.5	
		after	2,3±0,9*		
Self-assessment of independence and activity	Main	before	1,7±1,1	631	18
		after	2,7±0,9* (**)		
	Cont.	before	1,6±1,0	753.5	
		after	2,2±0,8		

\* - reliability of differences before and after, \*\* - reliability of differences between groups at  $p \leq 0.01$

In the sixth grade, the "station rotation" model was implemented, focused on alternating direct personal communication between the teacher and the student and indirect, with the inclusion of information and communication technologies. The class is divided into three groups, during the lesson the teacher independently sets the alternation of the work of groups, and their transition from one station to another. Stations can be distributed in the following way: a) work with the teacher (analysis of the exercise into elements, its holistic implementation); b) work in a group with the use of sports equipment; c) homework control (studying a video recording with a completed exercise (the student must choose the correct option). The teacher selects an information resource from the topics of the section and the topic of the program of the subject "Physical Education". During the lesson, students go through each station. The teacher acts as an assistant in performing tasks. Conducting a lesson in full-time format, the teacher not only conveys the necessary information on the topic of the lesson, but also corrects the mastered material and motivates the student to get acquainted with new material. Thus, it stimulates such characteristics as self-development, independence, activity, reflection, assessment of the achieved

result. Before and after the introduction of the "rotation of stations" model, we tested students on the knowledge of the subject, the activity (liveness) of each student during the lesson and independence in completing tasks. Tests and assessment criteria were prepared. Diagnostic results showed differences between students of the main group (48 people) and students in the control group (50 people) (Table 3).

So, the results of testing sixth-grade students after the introduction of the blended learning model of "station rotation" into educational practice showed a positive result. The empirical value in the groups is in the zone of significance at  $p \leq 0.01$ . However, when calculating as a percentage, there is a difference between the main and control groups. In terms of the formation of knowledge on the subject, the results of the main group are 15 % higher, the analysis of the results of an expert assessment of independence and activity in the main group is 16 % higher, unlike the control group, testing students in determining personal self-esteem of independence and activity showed changes in the main group by 7 %. The obtained data prove the effectiveness and availability of the introduction of blended learning into the methodology of teaching physical education at school.

Table 3. The results of the formation of knowledge, independence and activity of 6th grade students in the subject "Physical Education" when introducing the model "rotation of stations"

Indicators	Groups		M±σ	U <sub>emp</sub>	Δ%
Formation of knowledge on the subject	Main	before	1,8±1,2	580.5	15
		after	2,8±1,0* (**)		
	Cont.	before	1,7±1,2	851.5	
		after	2,4±0,9*		
Expert assessment of independence and activity	Main	before	1,8±1,3	590	16
		after	2,9±1,2* (**)		
	Cont.	before	1,8±1,3	808	
		after	2,5±0,9*		
Self-assessment of independence and activity	Main	before	1,8±1,3	603	7
		after	2,8±1,0* (**)		
	Cont.	before	1,7±1,4	801	
		after	2,6±1,0*		

\* – reliability of differences before and after, \*\* – reliability of differences between groups at  $p \leq 0.01$

### Conclusions

So, the introduction of blended learning models into the methodology of teaching physical education in a general education organization is revealed as a significant regulator of the implementation of priority areas of the state, the

guarantee of the health of the nation and the basis of national security, one of the key competitive advantages of preparing school graduates for the formation of life and educational success, admission to professional educational institutions, institutions and optimal integration into society.

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