

<https://doi.org/10.31489/3081-0531/2026-3-5/4-11>

UDC 372.879.6

Received: 19.07.2026 | Accepted: 22.08.2026 | Published online: 30 September 2026

K.M. Suleyeva¹, A.V. Yaroshenko^{2*}, Zh.B. Abishev³, A.N. Imanbetov⁴,
K.I. Sadykov⁵, D.A. Kusainov⁶

Buketov Karaganda National Research University, Karaganda, Kazakhstan

**Corresponding author's e-mail: alina_yaroshenko_03@mail.ru*

¹ORCID 0000-0002-3806-8540

²ORCID 0009-0000-5091-9400

³ORCID 0000-0002-4067-3571

⁴ORCID 0000-0003-0306-5734

⁵ORCID 0000-0001-8207-4932

⁶ORCID 0009-0009-6136-2770

Developing Middle School Students' Interest in Physical Education: A Pedagogical Model and Experimental Results

Fostering sustained interest in physical education among middle school students is regarded as an important factor in improving the effectiveness of school physical education within the framework of the updated educational content in the Republic of Kazakhstan. At the same time, declining student motivation highlights the need for pedagogical approaches that can enhance students' engagement in the educational process. The purpose of this study was to develop and experimentally evaluate a pedagogical model aimed at fostering middle school students' interest in physical education. The study was conducted at Kanysh Satpayev Gymnasium in Karaganda, Kazakhstan, and involved students from Grades 6B and 6G. The research methods included a review of the scientific literature, a questionnaire survey, pedagogical observation, physical fitness testing, a pedagogical experiment, and statistical analysis. The proposed pedagogical model was based on the integrated use of game-based, interactive, and digital educational technologies designed to enhance students' cognitive engagement and personal interest in physical education. The experimental results demonstrated a positive change in students' level of interest in physical education: the proportion of students with a high level of interest increased from 22.39% to 44.48%, whereas the proportion of students with a low level of interest decreased from 27.22% to 15.16%. In addition, improvements in the physical fitness of students in the experimental group were observed. The findings provide evidence supporting the effectiveness of the proposed pedagogical model and suggest its potential applicability to the organization of physical education in general secondary schools in the Republic of Kazakhstan.

Keywords: physical education, school physical education, middle school students, interest in physical education, pedagogical model, learning motivation, pedagogical experiment, physical fitness, digital educational technologies.

Introduction

In the context of the ongoing development of the secondary education system in the Republic of Kazakhstan, particular emphasis is placed on improving the quality of physical education, creating conditions that foster students' sustained motivation to engage in physical activity, and implementing contemporary pedagogical approaches. These priorities are reflected in the Instructional and Methodological Letter of the Altynsarin National Academy of Education, On the Peculiarities of the Educational Process in General Secondary Schools of the Republic of Kazakhstan in the 2025-2026 Academic Year, which highlights the importance of enhancing the quality of physical education lessons, applying modern teaching approaches, and fostering a sustainable commitment to a healthy lifestyle among schoolchildren [1].

According to the Model Curriculum for the Subject Physical Education for Grades 5–9 of Basic Secondary Education, one of the expected learning outcomes is the development of students' sustained motivation to participate in physical education, increased engagement in physical activity, and the development of physical fitness [2].

Over the past decade, the role of physical education in general secondary schools has expanded considerably. Alongside the development of motor abilities and physical fitness, school physical education is increasingly expected to contribute to students' health literacy, social development, emotional well-being, and the formation of lifelong habits of physical activity. These expectations have become particularly relevant in the context of declining daily physical activity among adolescents, the growing influence of digital technologies on leisure behavior, and increasing concerns about sedentary lifestyles. Under such conditions, the effectiveness of physical education depends not only on curriculum content but also on students' willingness to participate actively in the learning process [3].

For this reason, researchers have paid increasing attention to students' interest in physical education as one of the key determinants of successful learning. Regular attendance alone does not guarantee meaningful engagement in classroom activities. School practice demonstrates that many students formally participate in physical education lessons while remaining passive during learning tasks and showing little motivation to continue physical activity outside school. Such attitudes gradually reduce participation in organized exercise and weaken the educational value of physical education. Consequently, sustaining students' interest has become an important objective of contemporary physical education research [4].

Current theoretical approaches also reflect a shift in understanding the nature of interest itself [5]. Earlier psychological theories often described interest as a relatively stable personal characteristic. More recent studies, however, emphasize its dynamic character, arguing that interest develops through continuous interaction between the learner and the educational environment. From this perspective, students' attitudes toward physical education are shaped not only by individual characteristics but also by lesson organization, teacher–student interaction, learning experiences, and the overall educational climate. This understanding places greater responsibility on teachers to create learning environments capable of maintaining students' engagement over time.

These developments have stimulated extensive research into pedagogical approaches designed to strengthen students' motivation and participation in physical education. Recent studies have examined the educational potential of game-based learning, gamification, cooperative learning, digital educational technologies, and individualized instruction. Although these approaches differ in methodology, many authors arrive at a similar conclusion: improvements in students' motivation depend less on the isolated use of innovative teaching techniques than on the way these techniques are integrated into everyday classroom practice. In other words, the educational value of individual methods is largely determined by the coherence of the instructional process rather than by the methods themselves [6].

Despite substantial progress in this area, an important limitation remains. Much of the existing literature evaluates the effectiveness of individual teaching strategies, whereas considerably less attention has been devoted to comprehensive pedagogical models that combine several educational approaches within a single instructional framework. This distinction is particularly important because physical education lessons rarely rely on only one instructional strategy. Instead, teachers simultaneously employ different forms of interaction, digital resources, game activities, feedback techniques, and motivational tools. Understanding how these elements function together may provide a more realistic explanation of students' engagement than studying each approach separately [7].

An additional challenge concerns the transferability of educational findings across different national contexts. The effectiveness of pedagogical innovations depends on curriculum requirements, school organization, teacher preparation, and the broader educational environment. For Kazakhstan, these issues have become especially relevant following the implementation of the updated secondary education curriculum, which emphasizes functional literacy, student autonomy, initiative, and learner-centered instruction. Although national researchers have examined various aspects of physical education methodology, relatively few studies have investigated integrated pedagogical models specifically aimed at developing sustained interest in physical education among middle school students.

Against this background, the present study was designed to examine whether a pedagogical model integrating game-based, interactive, and digital educational technologies could improve middle school students' interest in physical education under the conditions of the updated school curriculum in the Republic of Kazakhstan. Unlike many previous studies that focused on the effectiveness of individual instructional tech-

niques, the present research evaluated the educational potential of a comprehensive pedagogical model implemented during regular physical education lessons [8].

The aim of the study was to develop and experimentally evaluate a pedagogical model for fostering middle school students' interest in physical education within the framework of the updated educational content implemented in the Republic of Kazakhstan.

Materials and Methods

Study Design

The research was carried out as a quasi-experimental study involving pre-test and post-test assessments of both a control and an experimental group. Such a design made it possible to evaluate changes in students' interest in physical education together with the dynamics of their physical fitness during one academic year.

The study was conducted at Kanysh Satpayev Gymnasium in Karaganda (Republic of Kazakhstan). The pedagogical intervention covered the entire school year and included three consecutive stages. During the initial stage, baseline data describing students' interest in physical education and their level of physical fitness were collected. The second stage focused on implementing the proposed pedagogical model during regular physical education lessons in the experimental group. At the end of the academic year, both groups completed the same assessment procedures, allowing the effectiveness of the intervention to be evaluated through comparative analysis.

Participants

Fifty-eight sixth-grade students aged 11-12 years participated in the study. Twenty-nine students from Grade 6B formed the control group, whereas twenty-nine students from Grade 6G comprised the experimental group.

Because the research was conducted under ordinary school conditions, students were not randomly assigned to groups. Existing school classes participated in the experiment without changes to their composition. Both groups followed the same curriculum and attended three physical education lessons per week. Before the intervention began, all participants completed identical baseline assessments to ensure comparability of the initial characteristics under investigation.

Research Methods

Several complementary research methods were employed.

A review of scientific and methodological literature was undertaken to identify current approaches to developing students' interest in physical education and to provide the theoretical basis for the proposed pedagogical model.

Pedagogical observation was used throughout the study to record students' participation during lessons, their interaction with teachers and classmates, and the degree of engagement demonstrated while performing learning tasks.

Students' interest in physical education was assessed using the diagnostic methodology developed by N.G. Luskanova [9].

Physical fitness was evaluated through a battery of standardized motor tests including a 30-m sprint, standing long jump, medicine ball throw, handgrip strength, pull-ups, a 3 × 10-m shuttle run, and the seated forward bend [10].

Pedagogical Intervention

Only the experimental group participated in the pedagogical intervention. Physical education lessons were organized according to the developed pedagogical model integrating game-based learning, interactive teaching methods, and digital educational technologies into regular classroom practice.

The control group continued studying according to the standard physical education curriculum without modifications to lesson organization or instructional content.

The effectiveness of the proposed model was determined by comparing pre-test and post-test indicators of students' interest in physical education together with changes in physical fitness observed in both groups.

Statistical Analysis

The collected data were processed using Microsoft Excel.

Descriptive statistical analysis included calculation of the arithmetic mean (M), standard deviation (SD), standard error of the mean (SEM), and coefficient of variation (CV). These indicators were used to summarize the experimental data and to compare the results obtained before and after the pedagogical intervention [11].

Ethical Considerations

The study complied with generally accepted ethical principles governing pedagogical research involving schoolchildren.

Participation in the study was voluntary. Before the beginning of the experiment, students and their parents received information about the objectives and procedures of the research. Oral informed consent for children's participation was obtained from parents prior to data collection.

Results and Discussion

The baseline assessment showed that, prior to the pedagogical intervention, students with a moderate level of interest in physical education predominated in both groups (Table 1). Their proportion accounted for 47.25 % in the control group and 50.35 % in the experimental group. A high level of interest was identified in 31.02 % of students in the control group and 22.39 % of those in the experimental group, whereas a low level of interest was observed in 21.72 % and 27.22 %, respectively.

The initial distribution indicates that the two groups were generally comparable at baseline. However, the experimental group demonstrated a less favorable distribution of interest levels, with a lower proportion of students exhibiting a high level of interest and a higher proportion demonstrating a low level of interest compared with the control group. This baseline difference provided an appropriate basis for evaluating the effectiveness of the proposed pedagogical model.

Table 1

Baseline Levels of Students' Interest in Physical Education Prior to the Pedagogical Experiment

Group	High level, %	Moderate level, %	Low level, %
Control group (n = 29)	31.02	47.25	21.72
Experimental group (n = 29)	22.39	50.35	27.22

The baseline questionnaire survey identified the main factors influencing students' attitudes toward physical education classes [12]. The findings showed that students expressed the greatest interest in game-based and competitive activities, team tasks, and exercises involving active interaction with their peers. Participants also emphasized the value of incorporating music and digital educational resources, which contributed to greater engagement and a more positive emotional atmosphere during lessons.

Conversely, the most frequently reported factors reducing students' interest included repetitive lesson content, limited variety of exercises, restricted opportunities to choose physical activities, and insufficient use of game-based teaching methods. These findings were taken into account when developing the proposed pedagogical model, which integrated game-based, interactive, and digital learning technologies into a unified instructional framework [13].

The post-intervention assessment demonstrated positive changes in both groups; however, the magnitude of improvement differed considerably (Table 2). In the experimental group, the proportion of students with a high level of interest increased by 22.09 percentage points, while the proportion of those with a low level of interest decreased by 12.06 percentage points. In the control group, the corresponding changes were +6.90 and -3.80 percentage points, respectively.

Overall, the results indicate that the educational intervention produced a substantially greater effect in the experimental group, where the increase in the proportion of students with a high level of interest was more than three times greater than that observed in the control group.

Table 2

Changes in Students' Interest Levels Following the Educational Intervention

Group	Change in high level (percentage points)	Change in moderate level (percentage points)	Change in low level (percentage points)
Control group	+6.90	-3.11	-3.80
Experimental group	+22.09	-10.01	-12.06

The observed changes in students' motivational profiles were accompanied by improvements in the physical fitness of the experimental group, suggesting a possible association between increased interest in physical education and more effective achievement of the intended learning outcomes (Table 3).

Table 3

Changes in the Physical Fitness Indicators of Students in the Experimental Group Before and After the Educational Intervention

Physical fitness test	Boys Before (M ± m)	Boys After (M ± m)	Improvement, %	Girls Before (M ± m)	Girls After (M ± m)	Improvement, %
30-m sprint, s	5.90±0.11	5.20±0.06	11.86	6.20±0.09	5.44±0.13	12.26
Handgrip strength (left), kg	9.68±0.14	27.93±1.07	188.53	6.00±0.19	21.18±0.80	253.00
Handgrip strength (right), kg	10.43±0.29	28.43±0.98	172.58	9.27±0.29	21.09±0.70	127.51
Standing long jump, cm	160.19±4.46	176.93±3.50	10.45	147.90±3.69	168.00±2.00	13.59
Medicine ball throw, cm	349.09±10.48	471.56±18.28	35.08	373.12±13.17	501.91±20.95	34.52
Pull-ups, repetitions	5.50±0.95	9.10±1.02	65.45	10.81±0.49	17.09±1.10	58.09
Shuttle run (3 × 10 m), s	9.75±0.11	8.64±0.11	11.38	10.04±0.14	8.90±0.11	11.35
Sit-and-reach test, cm	3.25±0.21	5.68±0.43	74.77	8.90±0.69	15.45±1.00	73.60

The results of the post-intervention fitness assessment demonstrated positive changes across all measured physical fitness indicators in the experimental group following the implementation of the proposed pedagogical model (Table 3). The largest gains were observed in measures of muscular strength and flexibility. Among boys, the greatest percentage increases were recorded for handgrip strength (188.53 % and 172.58 %), pull-up performance (65.45 %), and flexibility (74.77 %). Similarly, among girls, the most pronounced improvements were found in handgrip strength (253.00 % and 127.51 %), the sit-and-reach test (73.60 %), and pull-up performance (58.09 %). More moderate, yet consistent, improvements were observed in tests assessing speed, coordination, and speed–strength abilities.

Overall, improvements were observed across all measured physical fitness indicators in the experimental group. The greatest gains were recorded in strength- and flexibility-related tests, whereas more moderate changes were found in measures of speed and coordination.

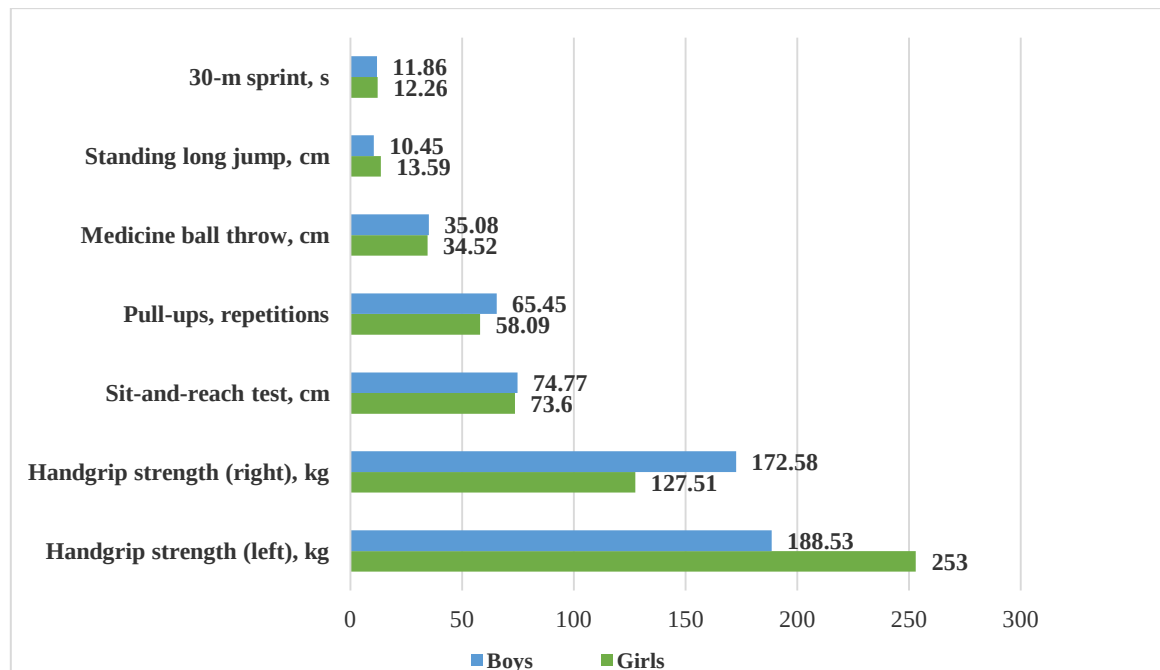


Figure 1. Percentage Changes in Physical Fitness Indicators of Boys and Girls in the Experimental Group After the Educational Intervention

The findings of the present study indicate that the proposed pedagogical model contributed to improvements not only in students' interest in physical education but also in their physical fitness. The most pronounced changes were observed in the experimental group, where an increase in the proportion of students with a high level of interest was accompanied by better performance across most physical fitness tests. These findings suggest that greater engagement in learning activities may create more favorable conditions for active participation in physical education and more effective acquisition of movement skills.

The results support the view that students' interest in physical education represents an important pedagogical resource capable of influencing learning outcomes [14]. Rather than being attributable to the use of isolated instructional techniques, the observed improvements appear to be associated with the integrated organization of the lesson. In the proposed model, game-based activities, interactive learning strategies, and digital educational tools were combined within a unified instructional framework, allowing each component to reinforce the others in achieving common educational objectives.

These findings are consistent with previous research addressing student motivation in physical education [15]. Systematic reviews have shown that game-based learning, digital educational resources, and gamification can increase students' motivation and engagement in physical education. However, considerably less attention has been paid to their influence on physical fitness and the long-term sustainability of motivational changes. Unlike most previous studies, which evaluated individual instructional approaches, the present study examined the effectiveness of integrating several complementary pedagogical strategies within a single educational model.

The findings are also consistent with the four-phase model of interest development proposed by Renninger and Hidi, according to which sustained interest develops progressively through interaction between learners and their educational environment [16]. From this perspective, game-based, interactive, and digital learning approaches should not be viewed as independent motivational tools but rather as complementary elements of an educational environment that supports students' active participation in learning.

Similar conclusions have been reported by Jastrow et al., who demonstrated that the effectiveness of digital educational technologies depends largely on the quality of their pedagogical integration into physical education lessons [17]. Likewise, Fernández-Espínola, Ferriz-Valero, Quintas, and their colleagues associated improvements in students' motivation with cooperative learning and gamification strategies [18, 19]. Nevertheless, most previous studies have focused on the effects of individual instructional approaches, whereas considerably less attention has been devoted to examining their combined implementation. The findings of the present study suggest that integrating several complementary pedagogical strategies may produce greater educational benefits than their isolated application.

Several limitations should be acknowledged. The study was conducted in a single general education school and involved only sixth-grade students. In addition, the intervention lasted for one academic year. Therefore, caution should be exercised when generalizing the findings to other age groups and educational settings. Future research should examine the effectiveness of the proposed pedagogical model in different school contexts and evaluate the long-term sustainability of the observed outcomes.

Conclusion

The findings of this study demonstrate that fostering students' sustained interest in physical education largely depends on the organization of the educational process. The implementation of the proposed pedagogical model was associated with an increase in the proportion of students demonstrating a high level of interest in physical education, accompanied by improvements in physical fitness indicators. The results suggest that integrating game-based, interactive, and digital learning approaches within a unified instructional framework provides favorable conditions for enhancing students' interest in physical education while supporting improvements in physical fitness.

The proposed pedagogical model has practical value for general secondary schools, as it can be implemented within the existing physical education curriculum without requiring substantial modifications to its content. The model may also serve as a methodological framework for planning physical education lessons and organizing extracurricular physical activity programs.

Several limitations should be acknowledged. The study was conducted in a single general education school and included only sixth-grade students. Consequently, further research is needed to examine the effectiveness of the proposed model across different age groups and educational settings. Future studies should also investigate the long-term impact of the intervention and evaluate its effectiveness under diverse organizational and pedagogical conditions.

References

- 1 Altynsarin National Academy of Education (2025). *Instructional and methodological letter "On the peculiarities of the educational process in general education schools of the Republic of Kazakhstan in the 2025-2026 academic year"*. Astana: Altynsarin National Academy of Education [in Russian].
- 2 Ministry of Education of the Republic of Kazakhstan (2022). *Model curriculum for the subject "Physical Education" for Grades 5–9 of basic secondary education*. Astana: Ministry of Education of the Republic of Kazakhstan [in Russian].
- 3 Bailey, R. (2006). Physical education and sport in schools: A review of benefits and outcomes. *Journal of School Health*, 76(8), 397–401. <https://doi.org/10.1111/j.1746-1561.2006.00132.x>
- 4 Jastrow, F., Greve, S., Thumel, M., Diekhoff, H., & Süßenbach, J. (2022). Digital technology in physical education: A systematic review of research from 2009 to 2020. *German Journal of Exercise and Sport Research*, 52(4), 504–528. <https://doi.org/10.1007/s12662-022-00848-5>
- 5 Renninger, K.A., & Hidi, S. (2022). *The Power of Interest for Motivation and Engagement*. Routledge.
- 6 Arufe-Giráldez, V., Sanmiguel-Rodríguez, A., Ramos-Álvarez, O., & Navarro-Patón, R. (2022). Gamification in Physical Education: A Systematic Review. *Education Sciences*, 12(8), 540. <https://doi.org/10.3390/educsci12080540>
- 7 Fernández-Espínola, C., Almagro, B. J., Tamayo-Fajardo, J. A., Paramio-Pérez, G., & Saénz-López, P. (2022). Effects of Interventions Based on Achievement Goals and Self-Determination Theories on the Intention to Be Physically Active of Physical Education Students: A Systematic Review and Meta-Analysis. *Sustainability*, 14(22), 15019. <https://doi.org/10.3390/su142215019>
- 8 Sal-de-Rellán, A., Hernández-Suárez, Á., & Hernaiz-Sánchez, A. (2025). Gamification and motivation in adolescents. Systematic review from Physical Education. *Front Psychol*, 16, 1575104. doi: 10.3389/fpsyg.2025.1575104.
- 9 Luskanova, N.G. (1999). *Metody issledovaniia detei s trudnostyami v obuchenii: uchebno-metodicheskoe posobie* [Research Methods for Children with Learning Difficulties: a Training Manual]. Moscow: Folium.
- 10 (2014). *Prikaz i.o. Ministra kultury i sporta Respubliki Kazakhstan ot 21 noiabria 2014 goda No. 103 «Ob utverzhdenii Pravil provedeniia prezidentskikh testov fizicheskoi podgotovlennosti naseleniia Respubliki Kazakhstan»* [Order of the Acting Minister of Culture and Sports of the Republic of Kazakhstan dated November 21, 2014 No. 103 "On Approval of the Rules for Conducting Presidential Physical Fitness Tests for the Population of the Republic of Kazakhstan"] (as amended on June 16, 2025). Registered with the Ministry of Justice of the Republic of Kazakhstan on December 22, 2014, No. 9988 [in Russian].
- 11 Thomas, J. R., Nelson, J. K., & Silverman, S. J. (2015). *Research Methods in Physical Activity* (7th ed.). Human Kinetics.
- 12 Camacho-Sánchez, R., Manzano-León, A., Rodríguez-Ferrer, J.M., Serna, J., & Lavega-Burgués, P. (2023). Game-Based Learning and Gamification in Physical Education: A Systematic Review. *Education Sciences*, 13(2), 183. <https://doi.org/10.3390/educsci13020183>

- 13 Jastrow, F., Greve, S., Thumel, M., Diekhoff, H., & Süßenbach, J. (2022). Digital Technology in Physical Education: A Systematic Review of Research from 2009 to 2020. *German Journal of Exercise and Sport Research*, 52(4), 504–528. <https://doi.org/10.1007/s12662-022-00848-5>
- 14 Ryan, R.M., & Deci, E.L. (2017). *Self-Determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness*. New York: Guilford Press.
- 15 Zach, S., Shoval, E., & Shulruf, B. (2023). Cooperative learning in physical education lessons: Literature review. *Frontiers in Education*, 8, 1273423. <https://doi.org/10.3389/educ.2023.1273423>
- 16 Luo, Y., Yang, Y., & Zeng, H. (2023). Relationship between Perceived Teacher Support and Student Engagement in Physical Education: A Systematic Review. *Sustainability*, 15(7), 6039. <https://doi.org/10.3390/su15076039>
- 17 Jastrow, F., Greve, S., Thumel, M., Diekhoff, H., & Süßenbach, J. (2022). Digital Technology in Physical Education: A Systematic Review of Research from 2009 to 2020. *German Journal of Exercise and Sport Research*, 52(4), 504–528.
- 18 Casey, A., & Goodyear, V.A. (2015). Can Cooperative Learning Achieve the Four Learning Outcomes of Physical Education? A Review of Literature. *Quest*, 67(1), 56–72.
- 19 El-Tanahi, N., Soliman, M., Abdel Hady, H., Alfrehat, R., Faid, R., Abdelmoneim, M., Torki, M., & Hamoudah, N. (2024). The Effectiveness of Gamification in Physical Education: A Systematic Review. *International Journal of Education in Mathematics, Science and Technology*, 12(2), 406–417.

Information about the authors

Suleyeva Karina Madievna — PhD, Associate Professor, Buketov Karaganda National Research University, Karaganda, Kazakhstan; e-mail: suleyevakm@mail.ru; ORCID 0000-0002-3806-8540

Yaroshenko Alina Vladimirovna (contact person) — Master of Pedagogical Sciences, Buketov Karaganda National Research University, Karaganda, Kazakhstan; e-mail: alina_yaroshenko_03@mail.ru; ORCID 0009-0000-5091-9400

Abishev Zhandos Bakhytovich — PhD, Associate Professor, Buketov Karaganda National Research University, Karaganda, Kazakhstan; e-mail: zabishev09@mail.ru; ORCID 0000-0002-4067-3571

Imanbetov Aman Nurkasimovich — Candidate of Pedagogical Sciences, Associate Professor, Buketov Karaganda National Research University, Karaganda, Kazakhstan; e-mail: aman_imanbetov@mail.ru; ORCID 0000-0003-0306-5734

Sadykov Kanat Ibragimovich — Doctor of Medical Sciences, Professor, Buketov Karaganda National Research University, Karaganda, Kazakhstan; e-mail: sadykovki@mail.ru; ORCID 0000-0001-8207-4932

Kusainov Daniyar Ampievich — Master of Pedagogical Sciences, Senior Lecturer, Buketov Karaganda National Research University, Karaganda, Kazakhstan; e-mail: kussainov502@gmail.com; ORCID 0009-0009-6136-2770