

METHODOLOGY FOR DEVELOPING STRENGTH, EXPLOSIVE POWER, AND SPEED IN HIGH SCHOOL STUDENTS DURING EXTRACURRICULAR ACTIVITIES USING THE SPECIAL MOBILE SIMULATOR “SAN.GAY-1”.

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Abstract: This study evaluates the effectiveness of the “SAN.GAY-1” *special mobile simulator* in improving the physical fitness of high school students during extracurricular activities. A system of *high-intensity exercises* was implemented during the study. The results showed improvements in students’ *explosive power and speed*, as well as a reduction in the *risk of injuries*. The mobile and flexible design of the simulator allows its effective use in educational institutions.

Keywords: high school students, physical fitness, mobile training simulator “SAN.GAY-1”, explosive power, speed development, physical education, high-intensity training, plyometric exercises.

Аннотация: Данное исследование направлено на оценку эффективности *специального мобильного тренажёра «SAN.GAY-1»* для повышения физической подготовленности старшеклассников во внеурочных занятиях. В ходе исследования была применена система *высокоинтенсивных упражнений*. Результаты показали улучшение показателей *взрывной силы и скорости*, а также снижение *риска травматизма*. Мобильная и гибкая конструкция тренажёра позволяет эффективно использовать его в образовательных учреждениях.

Ключевые слова: старшеклассники, физическая подготовленность, мобильный тренировочный тренажёр «SAN.GAY-1», взрывная сила, развитие скорости, физическое воспитание, высокоинтенсивные тренировки, плиометрические упражнения.

Annotatsiya: Mazkur tadqiqot darsdan tashqari mashg‘ulotlarda “SAN.GAY-1” *maxsus ko‘chma trenajyori* yordamida yuqori sinf o‘quvchilarining jismoniy tayyorgarligini oshirish samaradorligini baholashga qaratilgan. Tadqiqotda *yuqori intensivlikdagi mashqlar tizimi* qo‘llanildi. Natijalar o‘quvchilarning *portlovchi kuch va tezkorlik ko‘rsatkichlari oshganini hamda jarohatlanish xavfi kamayganini* ko‘rsatdi. Trenajyorning *ko‘chma va moslashuvchan konstruksiyasi* uni ta’lim muassasalarida samarali qo‘llash imkonini beradi.

Kalit so‘zlar: yuqori sinf o‘quvchilari, jismoniy tayyorgarlik, “SAN.GAY-1” *ko‘chma trenajyori*, *portlovchi kuch*, *tezkorlikni rivojlantirish*, jismoniy tarbiya, yuqori intensivlikdagi mashg‘ulotlar, plyometrik mashqlar.

Relevance of the Study: At present, the development of physical qualities such as strength, explosive power, and speed among high school students is an important factor not only for achieving high sports performance but also for ensuring future professional readiness, labor productivity, and functional stability. During this age period, the morphofunctional systems of the body actively develop, making targeted training of muscle strength, reaction speed, and coordination particularly effective. However, practical observations show that students’ physical training in general education schools is mostly limited to regular physical education classes, while extracurricular activities are often unsystematic and lack individualized training loads or

progressive intensity. As a result, the development of strength, explosive power, and speed remains insufficient.

Today, many professions—such as military service, law enforcement, emergency services, sports, and technical fields—require high levels of speed, strength, and explosive abilities. Therefore, integrating professionally oriented physical training elements into extracurricular activities during the school period has become an important and relevant issue. The extracurricular training sessions organized using the special mobile simulator “SAN.GAY-1” allow for the systematic application of:

- high-intensity plyometric and resistance exercises;
- acceleration and deceleration elements;
- functional strength and stabilization exercises;
- special exercises simulating professionally oriented movement activities.

The simulator is equipped with a sand-based flexible surface, which reduces impact forces, decreases excessive load on joints and tendons, and improves proprioceptive sensitivity. This not only accelerates the development of physical qualities but also contributes to reducing the risk of injuries.

Therefore, the use of the “SAN.GAY-1” simulator in extracurricular and professionally oriented training sessions has significant relevance as an effective scientific and practical tool for the targeted development of strength, explosive power, and speed in high school students. It also contributes to improving their functional readiness and preparing them physically for future professional activities.

Research Aim: The aim of this study is to develop a methodology for the targeted development of strength, explosive power, and speed in high school students aged 16–18 years through extracurricular and professionally oriented training sessions using the special mobile simulator “SAN.GAY-1”, and to scientifically evaluate its practical effectiveness through a pedagogical experiment.

Research Objectives:

- To determine the evaluation criteria and diagnostic testing system for assessing physical qualities such as strength, explosive power, and speed in high school students aged 16–18 years, and to substantiate their reliability.

- To develop a methodological system based on the principle of gradual load progression for the use of the special mobile simulator “SAN.GAY-1” in extracurricular and professionally oriented training sessions.

- To statistically analyze the impact of the developed methodology on strength, explosive power, and speed indicators based on a 9-month pedagogical experiment, comparing the results of the experimental and control groups.

- To develop a safe exercise algorithm aimed at reducing the risk of injuries by optimizing the intensity and volume of training loads during the training process, and to evaluate its effectiveness.

Research Methods:

Experimental method – conducting extracurricular training using the “SAN.GAY-1” simulator and evaluating its effectiveness.

Pedagogical observation and monitoring – regular assessment of students’ strength, explosive power, and speed.

Physical fitness tests – evaluation of training outcomes using standard tests.

Comparative and statistical analysis – comparison of pre- and post-training results

Methodological analysis – development of safe training recommendations based on load intensity and injury risk. *Research Results and Discussion.* The results of the 9-month pedagogical

experiment showed that extracurricular training sessions conducted using the *special mobile simulator* “SAN.GAY-1” significantly improved the *strength, explosive power, and speed indicators* of high school students. Monitoring and testing carried out with the *experimental group* ($n = 156$) and the *control group* ($n = 154$) demonstrated that:

- *Strength indicators*: The average strength of the students increased from 45.2 ± 5.1 kg before training to 51.8 ± 4.7 kg after training ($t = 8.23$; $p < 0.001$).
- *Explosive power*: The indicator increased from 2.85 ± 0.31 m/s to 3.42 ± 0.29 m/s ($t = 7.16$; $p < 0.001$).
- *Speed*: The speed indicator improved from 6.12 ± 0.45 m/s to 6.78 ± 0.40 m/s ($t = 6.89$; $p < 0.001$).

During the training process, students became more aware of their physical capabilities and paid greater attention to the correct execution of exercises, which helped reduce the risk of injuries by approximately two times. In addition, the mobile and flexible design of the simulator made it possible to organize training sessions effectively in various conditions.

The obtained results indicate that the use of the “SAN.GAY-1” simulator contributes not only to the development of explosive power and speed, but also to the improvement of students’ overall physical fitness. Moreover, the integration of this methodology into extracurricular and professionally oriented training sessions serves as an effective tool for reducing injury risk, controlling individual training loads, and increasing students’ interest in sports and physical activity.

The results are consistent with pedagogical research and international literature on the effectiveness of modern plyometric and resistance-based training methods, which confirms the scientific validity of the study.

Table 1.

Comparison of Students’ Strength Indicators (kg) Before and After the Experimental Period

<i>Group</i>	N	Mean ± SD (Pre-test)	Mean ± SD (Post-test)	t	p
<i>Experimental Group</i>	156	45,2 ± 5,1	51,8 ± 4,7	8,23	<0,001
<i>Control Group</i>	154	45,4 ± 5,0	46,1 ± 4,9	1,72	0,089

Note: The results of the *t-test* showed that extracurricular training sessions using the “SAN.GAY-1” simulator significantly increased the *strength indicators* of students in the *experimental group* ($p < 0.001$), while no statistically significant improvement was observed in the *control group*.

Table 2.

Comparison of Students’ Explosive Power and Speed Indicators (m/s) Before and After the Experimental Period

Parametr	N	Mean ± SD (Pre-test)	Mean ± SD (Post-test)	t	p
Explosive Power	156	2,85 ± 0,31	3,42 ± 0,29	7,16	<0,001
Speed	156	6,12 ± 0,45	6,78 ± 0,40	6,89	<0,001

Control Group – Explosive Power	154	2,86 ± 0,30	2,90 ± 0,32	1,15	0,253
Control Group – Speed	154	6,11 ± 0,44	6,16 ± 0,46	0,98	0,329

Note: Statistical analysis showed that after the training sessions, the indicators of explosive power and speed in the experimental group increased significantly, indicating improved adaptation of students to high-intensity exercises and enhanced physical fitness. In contrast, no significant changes were observed in the control group.

Methodological Recommendations: Extracurricular training sessions should last 30–40 minutes and be conducted 2–3 times per week, combining high-intensity exercises with functional training loads. Exercise intensity should be gradually adjusted according to students’ physical capabilities to optimize strength development and neuromuscular adaptation. Proper exercise technique and safety measures help reduce injury risk and improve coordination. The mobile design of the “SAN.GAY-1” simulator allows effective use in various school environments and facilitates its integration into extracurricular training. Training sessions should also be regularly monitored, with adjustments made according to students’ performance indicators.

Conclusion: The use of the “SAN.GAY-1” special mobile simulator in extracurricular training sessions significantly improved strength, explosive power, and speed among high school students. The *t*-test results ($p < 0.001$) confirmed that the observed changes were statistically significant. In addition, the training process contributed to a reduction in injury risk and improved students’ ability to perform exercises correctly.

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