

ATHLETIC TECHNICAL SKILLS OF STUDENTS AS TRAINING EFFICIENCY INDICATOR

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Abstract

The purpose of the study is to evaluate the effectiveness of training sessions among the 1st-3rd year students of the general physical training (GPT) volleyball groups.

Materials and methods. The athletic technical skills (ATS) have been tested by results of tests on upper and lower passes and serves. ATS testing of students from GPT volleyball groups was carried out at the beginning and at the end of the spring semester, in which 45 of the 1st year students (2 study groups), 60 of the 2nd year students (3 groups), 33 of the 3rd year students (2 groups) took part. The same students took part in the testing at the beginning and at the end of the semester (pairwise comparison).

Research result. The method to evaluate the effectiveness of practical training for the Program of "Physical Culture" has been developed. Special aspects of ATS indicators dynamics of the 1st-3rd year students of GPT educational groups with sports orientation (volleyball) from the beginning to the end of spring semester were revealed.

Conclusion. The highest efficiency of training sessions was observed among the 2nd year students. It is characterized by an increase in the number of students who successfully passed the tests on upper and lower passes by 5%, and 12%, respectively. The number of students who successfully passed the tests on serves increased by 11%, and a performance level grew from middle at the beginning of the semester to high at the end of the semester.

The lowest effectiveness of training sessions was observed among the 1st year students. The outcome indicator of volleyball basic training corresponds to medium level at the beginning and at the end of the spring semester. The change in the number of students who successfully passed the tests on upper passes (-2%), lower passes (-2%), and serves (+2%) was insignificant from the beginning to the end of the semester.

Keywords: athletic and technical skills (ATS), general physical training (GPT), testing, training session's effectiveness.

Introduction

A literature review shows an increasing number of students who have a low level of physical education (Shilko, 2007; Martynyuk & Vilyansky, 2015; Druz, Iermakov, Nosko, Shesterova, & Novitskaya, 2017). This affects the state of health, which is a factor in wellbeing of a future specialist (Korol, 2014; Keniua & Bowmased, 2016). The major reason is a sharp reduction in a physical activity (Grygiel-Górniak, Tomczak, Krulikowska, Przysławski, Seraszek-Jaros, & Kaczmarek, 2016; Sternfeld, Gabriel, Jiang, Whitaker, Jacobs, Quesenberry, Carnethon, & Sidney, 2019).

The main problem in the university physical education management is a lack of information providing a feedback between subjects (Semenov & Mironova, 2006; Anikieiev, 2015).

Assessment of a physical education state among students is a leading factor in the pedagogical process. It promotes a growth of athletic and technical skills of students (Sidorova, 2009) and contributes to increasing interest in a physical activity (Baka, 2010; Druz, Iermakov, Artemyeva, Puhach, & Muszkieta, 2017).

The dynamics of physical fitness indicators cannot be a one objective criterion of a physical education effectiveness (Akhmatgatin, Lebedinsky, Khomyakov, Kudryavtsev, Galimova, Kamoza, Panov, Kuzmin, Gaskov, Sidorov, & Doroshenko, 2020).

Athletic and technical skills (ATS) are defined as one of indicators of a training sessions effectiveness among students from the Main Department (Shcherbakov, Volkov, & Davidenko, 2010). It characterizes the level in the athletic technique. The need for the ATS assessment is noted by Ageevets, Efimov-Komarov, Efimova-Komarova, Lebedeva, and Perelman (2019), Ageevets, Efimov-Komarov, Efimova-Komarova, Nazarenko, and Puchkova (2020), Efimov-Komarova, Efimova-Komarova, Lebedeva, and Perelman (2020).

It is established that an athletic technique training increases the interest in practicing of a physical culture by students significantly (Sisova & Semiglazova, 2015; Surikova & Kozhanova, 2016; Bakuradze, 2020).

Tests to assess an athletic exercise technique in accordance with the athletic theory (Demchishin & Pilipchuk, 1979; Zhelezniak, 1988; Zhelezniak & Kunyansky, 2000; Sharafeva, 2009) are widely used in a volleyball practice (Zatsiorsky, 1982; Godick, 1988).

Akhmerov, Akhmerov, and Shiryaev (2004) presented the results of theoretical and experimental studies that allow objectively characterize the testometric level of physical and theoretical fitness of volleyball players. Tests must meet two basic requirements: they must be reliable and informative.

The literature offers tests that are developed for qualified athletes, not suitable for non-athletes and do not have a sufficient bandwidth.

The literature review didn't identify any tests and standards to evaluate technical skills of volleyball players among students of non-sports universities (Scherbakov, et al., 2010).

There are following tests to assess volleyball technical fitness of beginner athletes (9-13 years old) of sports schools such as upper and lower passes, (above and in front, respectively), serve, attack and block (Pashkova, 2009; Gulyayeva, 2013).

There were tests developed to assess athletic and technical skills of the 1st through 3rd year students of general physical training groups (GPT) with a specialization in volleyball (Barantsev, Naidyonova, & Sarycheva, 2009). Three tests were tested; they included upper/lower passes and serve. They became more complex from 1st through a 3rd study year. It has been established that testing allows to objectively analyze a training level in volleyball playing basic technical skills among students of 1-3 study year and to evaluate athletic and technical fitness of GPT student groups.

The studies by Barantsev, Domashchenko, and Chicherin (2019), Barantsev (2020) presented tests and standards for assessing ATS among the GPT groups with various specializations (GPT-volleyball, GPT-football, GPT-basketball, GPT-athletics, GPT-ping-pong, etc.).

Male and female 1st year students from the physical education groups, with a different sports specialization, showed significant differences in the development of general athletic fitness, both in the dynamics of average values and in comparing deviations (changes) in athletic fitness indicators from the beginning to the end of the school year. Female 1st year students from the GPT-aerobics group showed the highest level in a development of general physical fitness (6 points). In the GPT-athletics and GPT-volleyball groups the effectiveness is slightly lower (5 and 4 points, respectively). It corresponds to two points in the GPT athletics group (Grunina, Yermakov, Logacheva, & Naidyonova, 2009). The development of basic physical skills during a "Physical Culture" practice reaches 5 points among young men of GPT-boxing

group. The effectiveness is slightly lower among GTP-basketball group students (3 points). In the GPT-football groups, the effectiveness of classes is the lowest (1 point) (Barantsev, Kolesnikov, Pekhterev, & Skorodumov, 2010).

We studied the dynamics and developed standards for assessing athletic and technical skills among the 1st year students of GPT-volleyball groups (Barantsev, Katilin, Naidyonova, & Sarycheva, 2012). It was established that the use of the above tests in the educational process allows to objectively analyze a level of training among 1st and 2nd year students in basic technical methods of playing volleyball and to evaluate the athletic and technical skills of students of GPT-volleyball groups (Barantsev, Vedisheva, & Naidyonova, 2013).

Barantsev and Naydenov (2017) presented a methodology and standards to assess an athletic and technical fitness among 1st-3rd year students of the GPT-volleyball groups.

It was established that the indicators of the athletic and technical skills decrease significantly from the 3rd to 4th semester among non-athletic students of the 2nd study year from the GPT-volleyball groups. The reason is the decrease in the number of practical classes (from 40 in the 3rd semester to 24 in the 4th semester) (Barantsev, Chicherin, Naidyonova, & Bychkova, 2019).

The literature review didn't show any studies evaluating the effectiveness of practical classes based on indicators of athletic and technical skills among students from the GPT-volleyball groups.

The purpose of the study is to evaluate the effectiveness of training sessions among the 1st-3rd year students of the GPT-volleyball groups.

The objectives are:

1. To identify specifics of the test results among the 1st-3rd year students from the GPT-volleyball groups during the spring semester.

2. Based on the ATS dynamics during a semester, evaluate the effectiveness of training sessions among the 1st-3rd year students from the GPT-volleyball groups.

Materials and methods

Table 1 summarizes tests we developed to evaluate ATS among 1st-3rd year students from the GPT-volleyball groups (Barantsev et al., 2009).

Detailed recommendations for testing are presented in the monograph (Barantsev et al., 2019) and the manual (Barantsev, 2020). The height of an upper and lower serve is 1.5-2.0 m. A subject has three attempts to perform a test during one class. The test is performed a required number of times, non-stop. For each test, students get a "pass" or "failure" grade. Then, a study group training level is assessed for the first (test No. 1), second (test No. 2) and the third exercise (test No. 3).

Table 2 presents standards we developed to evaluate indicators of an athletic performance among GPT-volleyball groups (Barantsev & Naydenova, 2017). The standards are the same for female and male students of the same study year.

Students who regularly attended practical classes and participated in testing were included into a study cohort as 100%. A proportion of students who completed either upper or lower serve are considered 100%.

Statistical analysis methods were employed to analyze the results.

Table 1. Athletic and technical skills (ATS) tests evaluation of 1-3 courses students from GPT-volleyball groups

№	Test name	Pass		
		1 course	2 course	3 course
1	Upper pass with two hands – above itself (number of times)	15 (on area of 9×9 m ²)	20 (on area of 9×9 m ²)	20 (on area of 3×3 m ²)
2	Lower pass from below with two hands – in front of you (number of times)	15 (on area of 9×9 m ²)	20 (on area of 9×9 m ²)	20 (on area of 3×3 m ²)
3	Serve (number of times) optional: – bottom (or side) – from above	6 of 10 5 of 10	7 of 10 6 of 10	8 of 10 7 of 10

Study design

ATS testing of students from GPT-volleyball groups was carried out at the beginning and at the end of the spring semester, in which 45 of the 1st year students (2 study groups), 60 of the 2nd year students (3 groups), 33 of the 3rd year students (2 groups) took part. The same students took part in the testing at the beginning and at the end of the semester (pairwise comparison).

Students enrolled in study groups at the beginning of each semester at will. Therefore, their ability to play volleyball was different. In this regard, if a student did not play volleyball at all or took classes for just one semester, then he was tested according to the 1st study year program; if he took 2-3 semesters of classes then he was tested according to the 2nd study year program; 4-5 semesters – according to the 3rd study year program.

The curriculum of the training sessions for students of the GPT-volleyball groups is presented in the manual (Barantsev, 2015). Students in these groups are mainly engaged in a general physical training and improving volleyball skills. A practical training methodology is based on a modern knowledge about volleyball playing technical skills among the 1st-3rd study year students from the GPT-volleyball groups (Zheleznyk, 1989; Sharafeeva, 2009).

There were 24 practical trainings conducted with the 1st, 2nd, 3rd study year students from the Main Department during a spring semester. Students neither from the Specialized department (students who had health problems) nor from the Sports Department (students who have a sports qualification and regularly participate in student sports competitions such as Moscow student games) didn't participate in the study. Health wise, all study participants belong to the core medical group.

Study results

Based on the test results, the teacher of the study group determines a proportion of students who pass the testing. Results are compared with the standards for assessing ATS indicators (Table 2).

Table 3 presents the dynamics of ATS indicators of the 1st, 2nd and 3rd study year students during a spring semester. A column on the left shows an academic semester and num-

Table 2. Athletic and technical skills (ATS) testing of students from general physical training group with sports orientation (volleyball)

Course	Level ATS	Upper pass (%)	Lower pass (%)	Serve (top or bottom - %)	Assessment of total level ATS
1	High	more 96	more 93	more 98	more 96
	Medium	85-96	80-93	88-98	82-96
	Low	less 85	less 80	less 88	less 82
2	High	more 97	more 94	more 98	more 96
	Medium	82-97	76-94	85-98	82-96
	Low	less 82	less 76	less 85	less 82
3	High	more 96	more 93	more 99	more 95
	Medium	82-96	76-93	86-99	83-95
	Low	less 82	less 76	less 86	less 83

ber of students in a study group who participated in the testing. The middle column represents a percentage of students who completed the test and reached a passing grade. The right column summarizes a final average test result for three tests.

Two groups of the 1st year students were tested in a spring semester. The trends in average performance indicators among 1st year students from the GPT-volleyball groups are presented in Figure 1.

The outcome indicator for students who completed upper and lower passes for a “pass” decreased by 2 percent, but still remained at the average level for training of these technical skills. The number of students who passed the testing increased by 2%. At the same time, a number of students performing upper pass increased by 7% (Table 3), which is indicating the effectiveness of the volleyball technique training among 1st year students.

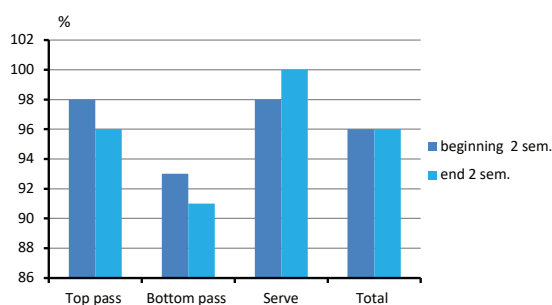


Fig. 1. Trends in average performance indicators of the 1st year students from GPT-volleyball groups

Three 2nd year groups of students were tested at the beginning and at the end of a spring semester. The Figure 2 depicts trends in performance indicators of the 2nd year students from GPT-volleyball groups.

The upper pass training rate increased by 5%, the lower one – by 12% and remained at the medium level of training for both. The number of students who passed the testing increased by 11%. The levels of these skills were medium at the beginning of the semester, and became higher at the

Table 3. Dynamics of ATS indicators (%) of students of 1-3 years academic group GPT-volleyball

Semester, number of students	Top pass	Bottom pass	Serve			Total
			Total	Bottom	Upper	
beginning 2 sem., n=26	96 (m*)	96 (h)	96 (m)	27	73	96 (m)
end 2 sem., n=26	92 (m)	92 (m)	100 (h)	25	75	95 (m)
beginning 2 sem., n=19	100 (h)	89 (m)	100 (h)	35	65	96 (m)
end 2 sem., n=19	100 (h)	89 (m)	100 (h)	24	76	96 (m)
Total: beginning 2 sem.	98 (m)	93 (m)	98 (m)	31	69	96 (m)
end	96 (m)	91 (m)	100 (h)	24	76	96 (m)
beginning 4 sem., n=22	95 (m)	95 (h)	95 (m)	25	75	95 (m)
end 4 sem., n=22	100 (h)	100 (h)	100 (h)	24	76	100 (h)
beginning 4 sem., n=16	75 (l)	75 (l)	93 (m)	36	64	81 (l)
end 4 sem., n=16	75 (l)	94 (m)	100 (h)	33	67	90 (m)
beginning 4 sem., n=22	82 (m)	73 (l)	79 (l)	16	84	78 (l)
end 4 sem., n=22	91 (m)	86 (m)	100 (h)	25	75	92 (h)
Total: beginning 4 sem.	84 (m)	81 (m)	89 (m)	26	74	85 (m)
end	89 (m)	93 (m)	100 (h)	27	73	94 (m)
beginning 6 sem., n=22	100 (h)	76 (m)	96 (m)	24	76	91 (m)
end 6 sem., n=22	95 (h)	91 (h)	100 (h)	23	77	95 (h)
beginning 6 sem., n=11	80 (m)	73 (m)	73 (l)	38	62	75 (l)
eEnd 6 sem., n=11	80 (m)	82 (m)	73 (l)	38	62	78 (l)
Total: beginning 6 sem.	90 (m)	75 (l)	85 (m)	31	69	83 (m)
end	88 (m)	87 (m)	87 (m)	31	69	87 (m)

* In a parentheses is an assessment of testing results among GPT students of each academic group - high (letter "h"), medium - "m" and low - "l" (Table 2).

end of the semester. The outcome indicator for three tests increased by 9%, but remained at the medium level. The following proves a high efficiency of training sessions with the 2nd year students.

Two 3rd year student groups were tested at the beginning and at the end of the spring semester. Trends in performance

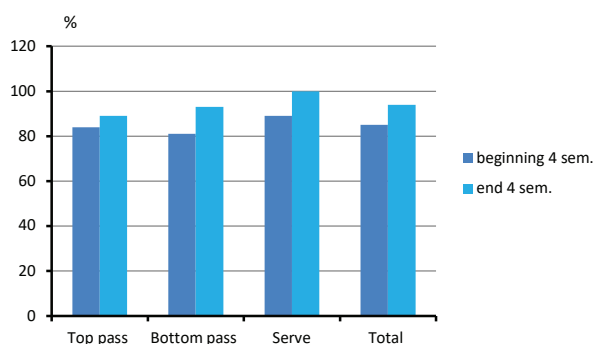


Fig. 2. Trends in performance indicators of the 2nd year students from GPT-volleyball groups

indicators of the 3rd year students from GPT-volleyball groups are presented in Figure 3.

The number of students who passed the test on upper pass decreased by 2%, but remained at medium level. Those ones who passed the test on lower pass and serve increased by 12% and 2%, respectively. Although, this number remained at the medium level of training in these technical skills. The outcome indicator of training in three volleyball playing

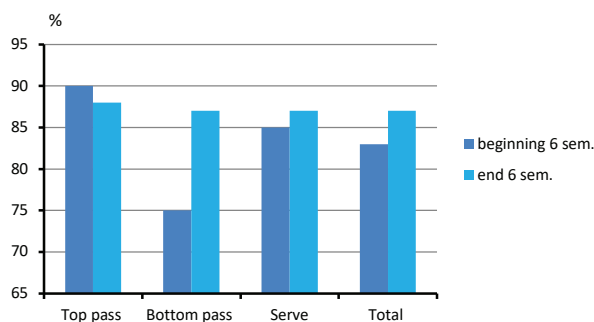


Fig. 3. Trends in performance indicators of the 3rd year students from GPT-volleyball groups

technical methods increased by 4%. Therefore, 3rd year students showed an improvement in the lower pass performing technique, and stabilizing in the upper pass and serves performing techniques during the semester. The outcome indicator of training in three volleyball technical methods remains at the medium level.

Discussion

The article presents the method to evaluate the effectiveness of practical training for the Program of "Physical Culture". It is based on the ATS indicators among 1st-3rd year students from the GPT-volleyball groups. It proposes the following:

- testing of volleyball basic techniques among students at the beginning and at the end of the semester;

- generalization of test results by study groups and study year;
- determining the percentage of students who successfully passed tests;
- determining the outcome test indicators of study groups by a study year;
- evaluation of test results of study groups according to developed standards;
- analysis of trends in ATS among students by a study year.

This methodology is designed for physical culture coaches. Therefore the simplified statistical analysis such as a percentage and average calculation is used to evaluate test results. The proportion of students who successfully passed tests is compared with the ATS assessment standards. This methodology is simple and it is widely used in our practice.

The study results showed that reliable differences correspond to the ATS indicators change among students from GPT-volleyball groups by 7% or more (Barantsev et al., 2019). Moreover, a high efficiency volleyball technical training is determined by moving from a lower to a higher level of training.

For example, the number of the 2nd year students who successfully passed tests increased by 11%. At the same time, the level of training has increased from medium at the beginning of the semester to high at the end of the semester. The most efficient training sessions for the 2nd year students are characterized by a 12% increase in the number of students who successfully passed lower passes. In this case, the result at the end of the semester is only 1% less than the top boundary of medium level.

Similar trends in performance of lower passes are seen among 3rd year students – low level of training at the beginning of the semester reached medium one by the end of the semester. The performance increased by 12%.

In one of 1st year training groups, the test results of upper and lower passes decreased by 4% but the test results of serves increased by 4%. This case shows downward trend in a technical skills development and an improvement in serve performance.

Study groups are formed according to student interests. The attendance, student commitment during trainings differs. Therefore, instructor's performance during a semester should be evaluated according to average outcome indicators.

The study results showed that the assessment of training effectiveness is the most accurate when the same students from the GPT-volleyball groups are tested at the beginning and at the end of the semester. The ATS testing at the end of a semester only, characterizes the effectiveness of practical classes less accurately. This is negatively affected by a long winter session, exams, and a winter break; as well as students enrollment to specific groups at will in the beginning of each semester. Additionally, student ATS testing at the end of the semester only, does not allow to evaluate trends in testing indicators in the fall semester.

The standards we developed to evaluate ATS of the 1st-3rd year students have three levels: high, medium and low level of training in basic volleyball techniques. Currently, statistical material to develop standards with additional educational levels is being compiled.

Conclusion

ATS testing results are one of the objective indicators to evaluate the effectiveness of practical classes and improve

ment of technical skills among the 1st-3rd year students from GPT-volleyball groups;

The highest efficiency of training sessions was observed among the 2nd year students. It is characterized by an increase in a number of students who successfully passed the test on upper and lower passes by 5%, and 12%, respectively. The number of students who successfully passed the test on serves increased by 11%, and a performance level grew from medium at the beginning of the semester to a high at the end of the semester.

Less effective training sessions were observed among 3rd year students. It is characterized by a 12% increase in a number of students who successfully passed the test on lower passes, and maintaining the same percentage of students who completed successfully passed the test on upper passes and serves. The outcome indicator of a training in three volleyball technical skills corresponded to medium level;

The lowest effectiveness of training sessions was observed among 1st year students. The outcome indicator of volleyball basic training corresponds to medium level at the beginning and at the end of the spring semester. The change in a number of students who successfully passed the test on upper passes (-2%), lower passes (-2%), and serves (+2%) was insignificant from the beginning to the end of the semester.

Conflict of interest

Authors claim no conflict of interest.

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СПОРТИВНО-ТЕХНІЧНА ПІДГОТОВЛЕНІСТЬ СТУДЕНТІВ ЯК ІНДИКАТОР ЕФЕКТИВНОСТІ ПРАКТИЧНИХ ЗАНЯТЬ

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Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; Е – збір коштів

Реферат. Стаття: 7 с., 3 табл., 3 рис., 39 джерел

Мета дослідження – оцінити ефективність навчально-тренувальних занять зі студентами 1-3 курсів основного відділення навчальних груп загальної фізичної підготовки (ОФП) зі спортивною спрямованістю (волейбол).

Матеріали і методи. Спортивно-технічну підготовленість (СТП) студентів навчальних груп ОФП-волейбол оцінювали за результатами тестування верхньої, нижньої передачі та подачі. Тестування СТП студентів навчальних груп ОФП-волейбол проводили на початку та наприкінці весняного семестру, в якому взяли участь 45 студентів 1 курсу (2 навчальні групи), 60 студентів 2 курсу (3 групи), 33 студенти 3 курсу (2 групи). У тестуванні брали участь одні й ті ж студенти (попарно-зв'язкові варіанти).

Результати. Розроблено технологію оцінки ефективності практичних занять дисципліни «Фізична культура» на підставі одного з індикаторів – спортивно-технічної підготовленості студентів 1-3 курсів навчальних груп ОФП-волейбол. Виявлено особливості динаміки показників СТП студентів 1-3 курсів навчальних груп

ОФП зі спортивною спрямованістю (волейбол) від початку до кінця весняного семестру.

Висновок. Найбільш висока ефективність навчально-тренувальних занять відзначена на 2 курсі. Вона характеризується збільшенням кількості студентів які здали на «залік» верхні і нижні передачі на 5% і 12% – відповідно. Кількість студентів, які виконали на «залік» подачі, збільшилася на 11%, а рівень навченості з середнього на початку семестру виріс до високого в кінці семестру. Порівняно нижча ефективність навчально-тренувальних занять виявлена на 1 курсі. Підсумковий показник навченості студентів 1 курсу основним прийомом гри у волейбол на початку і в кінці весняного семестру відповідає середньому рівню. Динаміка кількості студентів, які виконали на «залік» верхні передачі (-2%), нижні передачі (-2%), подачі (+2%), від початку до кінця семестру незначна.

Ключові слова: спортивно-технічна підготовленість, загальна фізична підготовка, тестування, ефективність практичних занять.

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