



RESEARCH OF STUDENTS' RESULTS IN THE TEST "THROWING A SMALL DENSE BALL AT A HORIZONTAL TARGET"

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ABSTRACT

In the 1960s, the "Ready for Labor and Defense" complex was implemented. However, its ineffectiveness led to the creation of a three-tier National Physical Education Complex, the "Rodina" National Sports Complex. The aim of this study is to determine the results of students in the test "Throwing a small solid ball at a horizontal target". In the study, we used the following methods - testing, pedagogical observation, variation analysis, comparative analysis, graphical method. The testing was conducted during the 2023/2024 academic year. The study contingent is 50 students with an average age of 20.45 years from the first and second year of four faculties of Trakia University - Economics, Pedagogy, Agriculture and Veterinary Medicine.

Keywords: accuracy, strength, precision

Sport during totalitarian regimes was seen as an opportunity for propaganda through athletes and their successes. Realizing the potential of such activity, these regimes created the necessary conditions for their athletes to be competitive with athletes from other nations. This was achieved and became possible with the construction of a comprehensive system of physical training. This system needed to cover as much of the country's population as possible. The primary task of this system was to improve the physical fitness of the nation, and athletes were seen as the top of a large pyramid, which was based on the mass nature of physical education and sports events. Thus, the maxim expressed by the great Italian writer and philosopher Umberto Eco "Sport is Man, Sport is Society" has the potential to become a reality (1-3).

In the 1960s, the "Ready for Labor and Defense" complex was implemented. However, its ineffectiveness led to the creation of a three-tier National Physical Education Complex, the "Rodina" National Physical Education Complex. It took its final form in the early 1980s. A decree of the Council of Ministers

dated 25.02.1983 approved the basic requirements, principles and organization of the implementation of the "Rodina" National Physical Education Complex in Bulgaria (4-6). All students who met the standards of the complex were awarded a bronze, silver or gold badge. It was awarded at the end of the school year (7). A competition was held with the best ones. It was decided to control and evaluate the physical abilities of students on the basis of the "Rodina" National Physical Education Complex. A large number of studies have been conducted at Trakia University, Stara Zagora, focusing on the physical development and performance of students (8-13), but "Throwing a small solid ball at a horizontal target" has not been carried out so far.

To study physical development in their scientific works, sports specialists often include throwing a solid ball in test batteries. In team sports such as volleyball, the test provides information about the strength of the upper limbs (14, 15).

The aim of the present study was to determine the results of students in the test "Throwing a small solid ball at a horizontal target".

METHODOLOGY

To achieve the goal, we set the following tasks:
1. To conduct a literature study of the problem.

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2. To organize an experimental coverage of the test "Throwing a small solid ball at a horizontal target".
3. To process and analyze the data from the conducted testing.

Research methods:

1. Testing
2. Pedagogical observation
3. Variational analysis
4. Comparative analysis
5. Graphical method

The testing was conducted during the 2023/2024 academic year. The study contingent consisted of 50 students with an average age of 20.45 years from the first and second year of four faculties of Trakia University - Economics, Pedagogy, Agrarian and Veterinary Medicine.

The test was performed according to the descriptions and requirements of the Rodina Sports Complex, namely:

A coordinate grid was drawn on a previously prepared and equipped site 5m from the starting

and axial throwing lines (**Figure 1**). The center of the target is located 20 meters from the throwing line. The target consists of five concentric circles with a diameter of 1, 2, 3, 4 and 5 meters with a common center. It is thrown with one hand over the shoulder (from above). Identical statistical sheets were prepared for each student, for the exact location of the hits from each attempt. The maximum results in meters are also plotted separately. Each student is entitled to five attempts. The test is a complex coordination-spatial movement and its assessment is determined by the accuracy of the hits. Our observation during the test showed that the throw for most men is performed with almost maximum effort. According to the requirements of the complex for men (18-50 years old) the distance to the center of the circle is 20 meters and the scoring system is – 0, 1, 3, 5, 7 and 10 points for the central circle. The result is calculated by the sum of the points from the five throws.

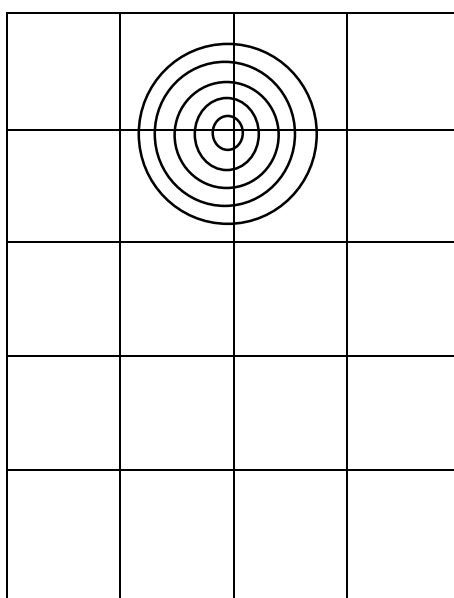


Figure 1. Coordinate grid of the throwing site

ANALYSIS OF THE RESULTS

Table 1 presents the total amount of types of assessments and their number from the target in the order of the attempts made. From the 500 attempts made, it can be seen that the number of zero assessments made is quite high – 444 (88.80%). This shows that their number is not significantly affected by the order of the attempt. The trend is similar for the other assessments.

The table shows that a significantly large percentage of the tested students failed to hit the horizontal target and scored 0 points. These are 198 attempts outside the target out of 250 attempts. This is 79.20% unsuccessful attempts. Out of 250 attempts, only 16 fell into the outermost circle for 1 point (6.40%), 17 attempts were in the 3-point zone (6.80%), 9 attempts were in the 5-point circle (3.60%), 6 attempts were in the 7-point zone (2.40%) and

4 attempts were in the center for 10 points (1.60%).

For comparison with students from the then VTU "Angel Kanchev" - Ruse, who took the

same test in the 1985/1986 academic year, the percentage of attempts with zero points for them was 45.3%.

Table 1. Sum of the total number of marks for attempts made

ATTEMPTS	RATINGS					
	0	1	3	5	7	10
I	45	2	2	1	0	0
II	39	2	4	2	1	2
III	41	5	2	1	0	1
IV	35	5	6	2	1	1
V	38	2	3	3	4	0
TOTAL	198	16	17	9	6	4

Accordingly, the percentages of female students from Ruse by points are as follows:

0 points – 45.3%

1 point – 12.10%

3 points – 15.60%

5 points – 13.70%

7 points – 7.90%

10 points – 5.40%

The comparison of the results between female students from Ruse and Stara Zagora is shown graphically in **Figure 2**.

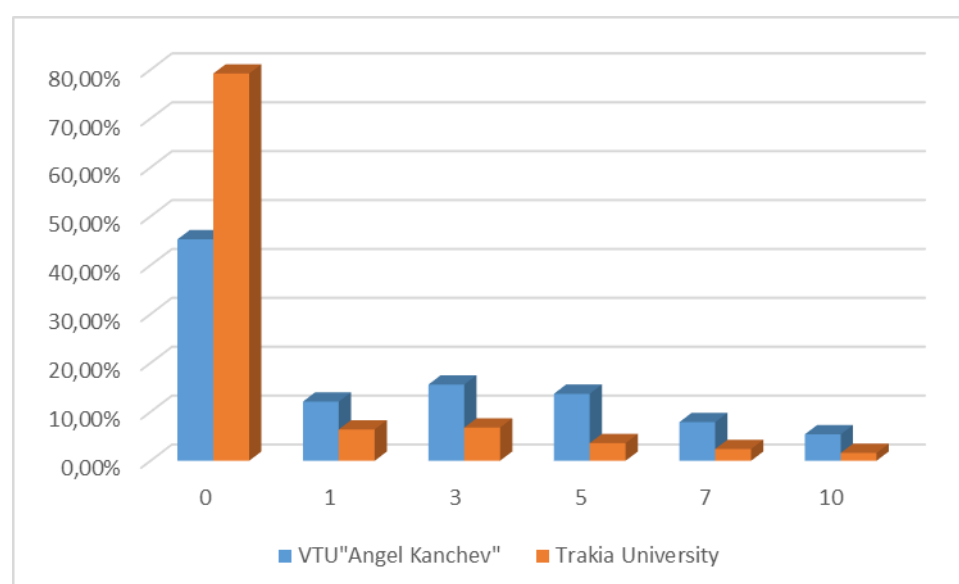


Figure 2. Comparison of the results of students from Ruse in the 1985/86 academic year and students from Stara Zagora in the 2023/2024 academic year

It is clearly noticeable that the students' results were much better in the 1985/86 academic year. In the 2023/24 academic year, there was an almost double increase in the relative share of students who did not meet the horizontal target and had 0 points.

Table 2 shows the number of students who also had zero grades. There were no students who had no zeros or only one zero (0%) in their attempts, two students had two zeros (4%), 10 students had three zeros (20%), 9 students had four zeros (18%) and 29 students had five zeros (58%).

Table 2. Number of students with zero grades

Number of zeros	No zeros	1	2	3	4	5
Number of students	0	0	2	10	9	29

If we compare with the students from the then VTU "Angel Kanchev" - Ruse, who took the same test in the 1985/1986 academic year, the percentage of students with zero grades is as follows:

Without zeros - 23%

With one zero - 17%

With two zeros - 15.50%

With three zeros - 13.50%

With four zeros - 11%

With five zeros - 20%

The comparison of the results between the students from Ruse and Stara Zagora is shown graphically in **Figure 3**.

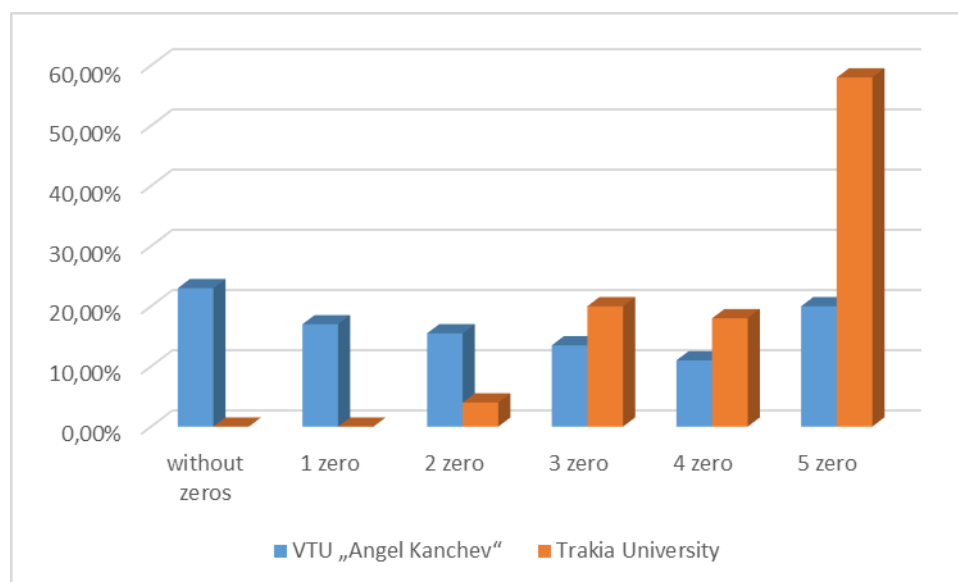


Figure 3. Comparison of the results of students by number of zeros from Ruse in the 1985/86 academic year and students from Stara Zagora in the 2023/2024 academic year

The results of students from Ruse are significantly better. In the 2023/2024 academic year, there are no students who do not have a zero or have only one zero. The relative share of students with two, three and four zeros is much lower compared to the results shown in the 1985/86 academic year. The relative share of students who did not hit the target even once in

their five attempts has increased almost 3 times compared to 1985/86.

Depending on the points for hitting the target, 25 students (50%) receive points. The boundary intervals through 10 points and the number of students are given in **Table 3**.

Table 3. Number of students by point intervals

Intervals	Number of students	Intervals	Number of students
From 1 to 10 points	16 (32%)	From 1 to 10 points	16 (32%)
From 11 to 20 points	7 (14%)	From 11 to 20 points	7 (14%)
From 21 to 30 points	2 (4%)	From 21 to 30 points	2 (4%)
From 31 to 40 points	0 (0%)	From 31 to 40 points	0 (0%)
From 41 to 50 points	0 (0%)	From 41 to 50 points	0 (0%)

For comparison, the results shown by the female students from Ruse in 1985/86 are:

The total number of female students who received points is 163 (81.5%).

From 1 to 10 points – 20%

From 11 to 20 points – 18.5%

From 21 to 30 points – 16%

From 31 to 40 points – 25.5%

From 41 to 50 points – 20%

The comparison of the results between the students from Ruse and Stara Zagora is shown graphically in **Figure 4**.

The results of students from Ruse are many times better than those shown in 2023/24. Only half of the students from Stara Zagora received any points, while the percentage of those from Ruse is over 80%. In the small ranges of points (from 1 to 20 points) the results are almost the

same. In the larger ranges of points, students from Ruse show significantly better results than students in the 2023/2024 academic year. In the range of 21 – 30 points, their result is 4 times better. In the 2023/2024 academic year, none of the students managed to enter the ranges of 31

– 40 and 41 – 50 points, i.e. no one scored more than 31 points. In contrast, 51 students in the 1985/1986 academic year from Ruse achieved a range of 31 – 40 points and 40 students 41 – 50 points.

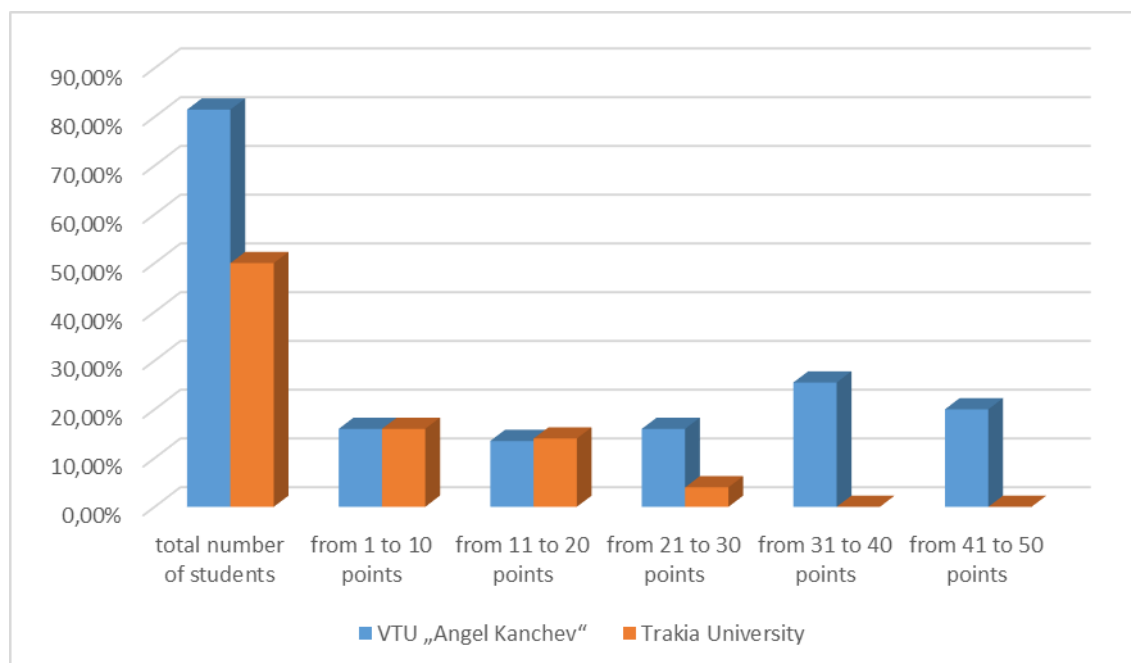


Figure 4. Comparison of the results of students by point intervals from Ruse in the 1985/86 academic year and students from Stara Zagora in the 2023/2024 academic year

One of the reasons for these results is the distribution of all hits by meter. Up to the 17.5 meter limit, which is the closest part of the circle to the throwing line, 173 (69%) were registered. The remaining 77 (31%) are above this limit, but 57 of them, although they cover the target

by meter, due to inaccuracy of the hits are also given a zero score.

To more fully clarify the real reason, a control test was also conducted to establish the maximum meter in throwing a small solid ball. The results are shown in **Table 4**.

Table 4. Results of throwing a small solid ball in meters

Meters	To 17,5 метра	17,5 – 20 м	20 – 22,5 м	Over 22,5 м
Students	26	12	8	4

The results show that 26 students (50%) cannot reach the minimum distance of 17.5 meters required for one point. Only 20 students (40%) achieve the maximum result (between 17.5 - 22.5 meters - the diameter of the outer circle of the target), although the average result of the maximum throw is 16.8 meters. For comparison, the results in 1985/86, when students from Ruse showed average values of 26.45 meters. It is worth noting that 12 of them can count, even with the most ideal throw, only 50% of the area of the closest part of the target. It follows that 50% will receive zero points, and for most of the rest, there remains a doubtful possibility of accurate hits, because their

maximum throw result corresponds to the footage for the individual marks from the target. In them, the effort to reach the target and possibly then achieve some kind of score will prevail. Many of the attempts made by the students of Trakia University in the 2023/24 academic year were in the range between 10 and 15 meters.

The influence of the asymmetric distribution on the accuracy depending on the dispersion of the individual attempts around the axis line was also studied. Of the 250 attempts made, 169 were hit on the right, of which 135 were without a score and 34 with a score. The remaining 81

attempts, which are on the left side, the ratio is 56 without a score and 25 with a score.. this shows that the dispersion does not significantly affect the accuracy of the hits.

CONCLUSIONS AND RECOMMENDATIONS

1. The results of the test "Throwing a small solid ball at a horizontal target" of students from Trakia University in the 2023/24 academic year are weaker than the results of students from Ruse in the 1985/86 academic year.
2. The strength of the upper limbs of students from Trakia University has significantly decreased and is at an unsatisfactory level.
3. When throwing over the shoulder, it is necessary to pay special attention to the coordination of the movement of individual parts of the body, because it is missing in the performance of students from Trakia University.
4. The accuracy of hitting the target has decreased many times compared to the results of students in 1985/86.

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