COMPARATIVE ANALYSIS OF STUDENT PERFORMANCE ON THE Y-BALANCE TEST

Tanasă Bogdan Ionuţ[1]
Vizitiu Elena[1]
Student, State University of Physical Education and Sports, Chișinău, Republic of Moldova[1]
Email adress [1] tanasaionut10@yahoo.com
"Stefan cel Mare" University from Suceava, Romania[1]
Email adress[2] elenav@usm.ro

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Abstract: In the case of a physical education and sport teacher, the way in which he or she orients his or her mindset can contribute significantly to communicating and working effectively with students and can positively influence the outcomes of the educational process. The aim of this paper is to conduct a comparative analysis of students' performance on the Y-Balance test, evaluating and comparing their results to identify and understand differences and similarities in functional ability and balance. The objectives of the study: to identify and analyze student balance levels between the experimental group (who played weekly basketball) and the control group (who followed the regular school curriculum); to analyze differences in performance on the Y Balance test between the two groups of students to determine if playing weekly basketball had a significant impact on balance compared to the control group; To differentiate the results of the Y Balance test in the group that practiced basketball during the experimental period (September - December 2023) and the control group that followed the standard school curriculum, in order to highlight possible changes in balance; To analyze and interpret the balance results obtained, providing an understanding of how regular basketball practice can influence students' balance.

Introduction: In a context where technological advances are on the rise, the question arises about the influence of our mindset and whether it can be adjusted to improve the educational process. Studies, both theoretical and empirical, point out that a teacher's professional mindset is shaped by many factors, including personality, perspective on others and self-perception. In the case of a physical education and sport teacher, the way in which he or she orients his or her mindset can contribute significantly to communicating and working effectively with students and can positively influence the outcomes of the educational process. [6]. We believe that communication skills are essential for both the teacher and the student, and progress in learning or improving a sport depends entirely on the quality of the interaction between teacher and student. According to G. Duck, "the teacher must

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intervene at the right moment for the student to get the message". [2,8]. Psychomotor activities are characterised by their physical nature, their pedagogical strategies, their biological effects and their social ways of organisation. They are not simply expressions of physical strength, but are ways of interacting with the various dimensions of the personality and contribute to the continuous improvement of the individual. [5]. Psychomotor skills are an essential element in primary school physical education classes. It is currently developed with complex techniques that are executed with speed and precision. To succeed in these activities, pupils need appropriate training from primary school onwards, focusing in particular on improving motor skills, which are closely linked to psychomotor skills. [3] The aim of the study was to analyze a methodological concept suitable for teaching basketball in physical education classes, following the new requirements of the current educational reform. The methodological concept addressed in the study involves the use of modules as systems of lessons subordinated to a central theme [4]. Because of the importance of balance in the game of basketball, the activity [1] proposes a series of exercises designed to improve this psychomotor skill. The results of the research showed that the exercises used had a positive impact on improving balance and it is recommended that they be integrated into physical education classes. It is important to adapt and complement these exercises according to the age, level of training and infrastructure of the athletes.

Material-method: The purpose of this paper is to conduct a comparative analysis of students' performance on the Y-Balance test, evaluating and comparing their results to identify and understand differences and similarities in their functional ability and balance. Aims of the work: to identify and analyse the students' balance levels between the experimental group (who practiced basketball weekly) and the control group (who followed the regular school curriculum); Analysis of the differences in performance on the Y Balance test between the two groups of students to determine whether weekly basketball practice had a significant impact on balance compared to the control group; Differentiation of Y Balance test results between the group that practiced basketball during the period of the experiment (September - December 2023) and the control group that followed the standard school curriculum to highlight possible changes in balance; Analysis and interpretation of balance results, providing an understanding of how regular basketball practice can influence students' psychomotor skills. At the beginning of Module I, we formed two groups of students, including both girls and boys, with each group having 16 participants for both the experimental and control groups. In the experimental group, we introduced the game of basketball every week, while the control group followed the regular school curriculum. The duration of the experiment was 3 months, running from September 2023 to December 2023. The students involved are in good health from a biopsychomotor point of view. For this experiment, we obtained student consent for participation. The experiment took place at Al. I. Cuza Secondary School in

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Fălticeni. The use of various research methods, such as bibliographic study method, experiment method, observation method, test method, mathematical-statistical method, as well as tabular and graphic methods, contributed to the elaboration and conduct of the proposed study. The Y Balance test was used to assess balance, evaluating certain aspects of it, such as anterior, posterolateral and posteromedial balance. This test is an essential component in assessing psychomotricity, providing valuable information about the ability to maintain balance in different positions and directions, fundamental aspects in coordination and control of movements, especially in the game of basketball.

Results: In this study, two distinct groups of participants were included: an experimental group and a control group, each group consisting of 17 members. Each member of both groups took an initial (TI) and a final (TF) test, and the difference between these two tests (D) was recorded. To provide a clearer perspective on the results, figures and graphs can be used to highlight the findings and differences between these groups.
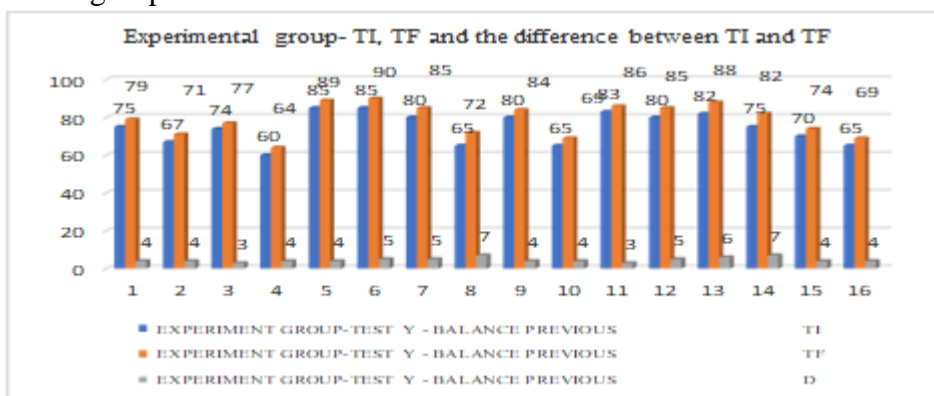

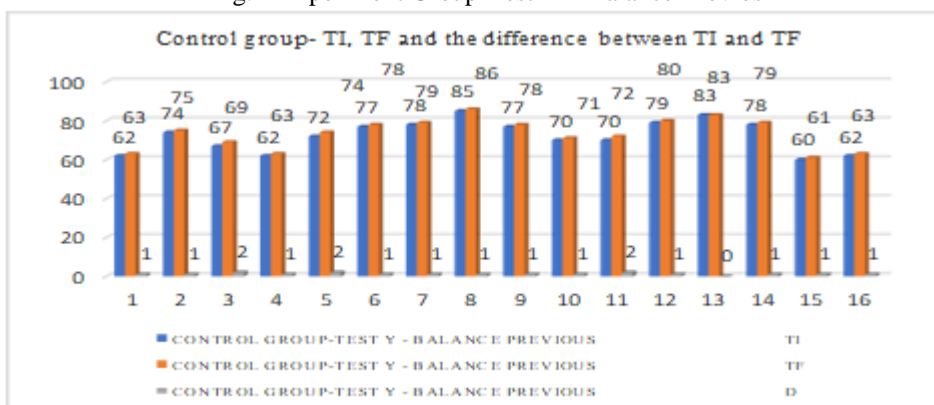Fig. 1 Experiment Group-Test Y – Balance-Previos

Fig. 2 Control Group-Test Y – Balance-Previous

Table 1 Statistical calculation- Experiment Group-Test Y - Balance
EXPERIMENT GROUP-TEST Y - BALANCE -PREVIOUS

Statistical indicators	Initial testing	Final test	The difference between the testers
Averange	74,44	79,00	4,56
Standard deviation	7,66	7,76	1,14
Coefficient of variability	10,29	9,82	24,90
Maximum	85,00	90,00	24,90
Minimum	7,66	7,76	1,14
Standard Error of the Mean	1,92	1,94	0,28

There is an increase in the average from initial testing (74.44) to final testing (79.00), the difference being 4.56. This indicates an improvement in performance in the Y-Balance test between the two test times. The standard deviation appears to be similar between the two test times. There is a decrease in the coefficient of variability from initial testing (10.29%) to final testing (9.82%), suggesting less relative variation of data relative to mean in final testing. The standard error of the mean appears to be close between the two tests, indicating consistency in mean estimates across both data sets with a difference of 0.28.

Table 2 Statistical calculation- Control Group -Test Y - Balance

CONTROL GROUP-TEST Y – BALANCE-PREVIOUS

Statistical indicators	Initial testing	Final test	The difference between the testers
Averange	72,25	73,38	1,13
Standard deviation	7,44	7,31	0,47
Coefficient of variability	10,30	9,96	41,75
Maximum	85,00	86,00	41,75
Minimum	7,44	7,31	0,00
Standard Error of the Mean	1,86	1,83	0,12

There is an increase in the mean from initial testing (72.25) to final testing (73.38) in the control group, the difference being 1.13. This indicates an improvement in performance in the Y-Balance test between the two test times. The standard deviation appears to be slightly lower in the final test compared to the initial in the control group. There is a decrease in the coefficient of variability from initial testing (10.30%) to final testing (9.96%), suggesting less relative variation of data relative to the mean in final testing. The maximum and minimum values for both tests are comparable and do not appear to differ significantly between the initial and final tests. This suggests that in terms of extremes (maximum and minimum values), the change is not significant. The difference in Standard Error of the Mean (SEM) between the initial and final test in the control group, from 1.86 to 1.83 with a difference of 0.12, may indicate a possible improvement in the accuracy of averaging estimation between the two test times.

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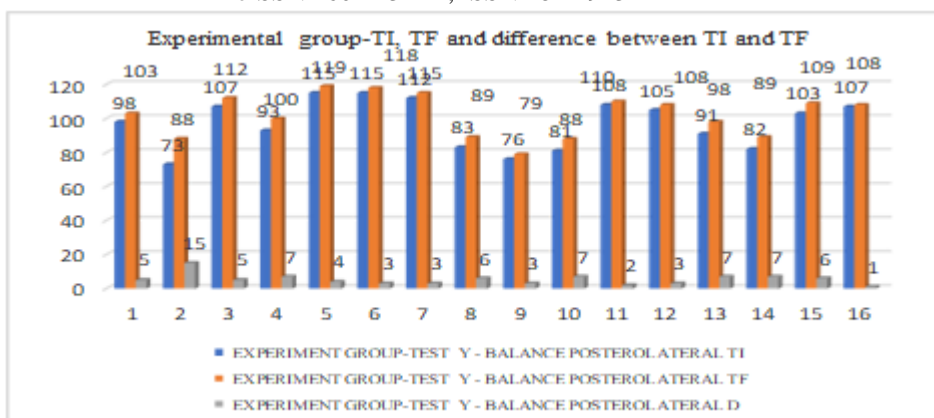eISSN 2601 - 341X, ISSN 1844-9131

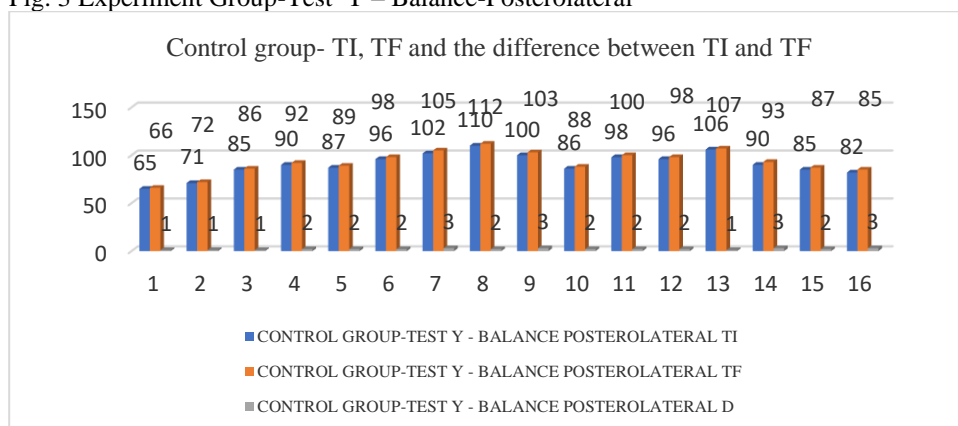Fig. 3 Experiment Group-Test Y – Balance-Posterolateral

Fig. 4 Control Group-Test Y – Balance-Posterolateral

Table 3 Statistical calculation- Experiment Group-Test *Y* - Balance

Statistical indicators	EXPERIMENT GROUP-TEST *Y* - BALANCE -POSTEROLATERAL		
	Initial testing	Final test	The difference between the testers
Averange	96,81	102,06	5,25
Standard deviation	13,37	11,58	3,06
Coefficient of variability	13,81	11,34	58,25
Maximum	115,00	119,00	58,25
Minimum	13,37	11,34	1,00
Standard Error of the Mean	3,34	2,89	0,76

There is an increase in the average from initial testing (96.81) to final testing (102.06), the difference being 5.25. This indicates an improvement in performance in the Y-Balance test between the two test times for posterolateral appearance. Standard deviation appears to be lower in the final test compared to the initial one, indicating a possible reduction in data variability in the final test. There is also a

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significant decrease in the variability coefficient from initial testing (13.81%) to final testing (11.34%), suggesting less relative variation of data relative to the mean in final testing. The standard error of the mean for the difference between tests is reduced (0,76), which may indicate greater precision in estimating the mean for this difference.

Table 4 Statistical calculation- Control Group -Test Y - Balance

CONTROL GROUP-TEST Y – BALANCE-POSTEROLATERAL

Statistical indicators	Initial testing	Final test	The difference between the testers
Averange	90,56	92,56	2,00
Standard deviation	11,26	11,52	0,69
Coefficient of variability	12,43	12,45	34,30
Maximum	110,00	112,00	34,30
Minimum	11,26	11,52	0,69
Standard Error of the Mean	2,82	2,88	0,17

There is an increase in the mean from initial testing (90.56) to final testing (92.56) in the control group, the difference being 2.00. This indicates an improvement in performance in the Y-Balance test between the two test times for posterolateral appearance. Standard deviation appears to be similar between the two test times in the control group. There is a slight increase in the coefficient of variability from initial (12.43%) to final (12.45%) testing, indicating a similar relative variation in data relative to the mean in both tests. The standard error of the mean for the difference between tests in the control group is reduced (0,17), which may indicate greater precision in estimating the mean for this difference.
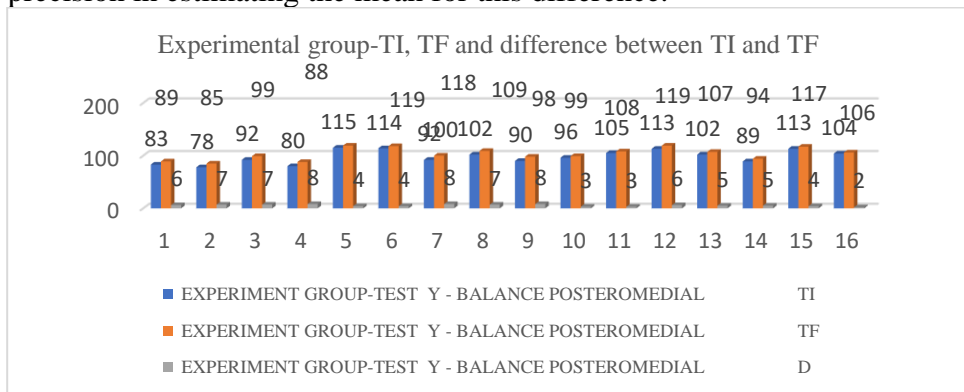

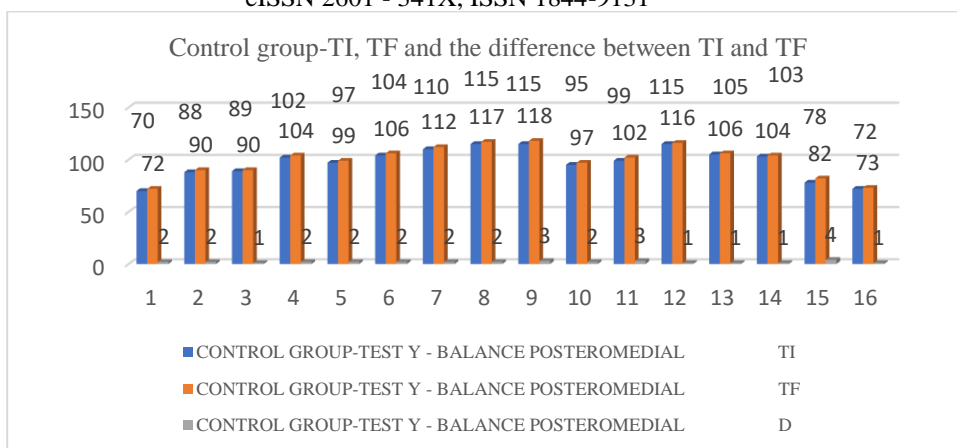Fig. 5 Experiment Group-Test Y – Balance-Posteromedial

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Fig. 6 Control Group-Test Y – Balance-Posteromedial

Table 5 Statistical calculation- Experiment Group-Test *Y* - Balance

EXPERIMENT GROUP-TEST *Y* - BALANCE -POSTEROMEDIAL			
Statistical indicators	Initial testing	Final test	The difference between the testers
Averange	96,81	102,06	5,25
Standard deviation	13,37	11,58	3,06
Coefficient of variability	13,81	11,34	58,25
Maximum	115,00	119,00	58,25
Minimum	13,37	11,34	1,00
Standard Error of the Mean	3,34	2,89	0,76

There is an increase in the mean from initial testing (96.81) to final testing (102.06) for posteromedial appearance. This indicates an improvement in performance in the Y-Balance test between the two test times. Standard deviation appears to be lower in the final test compared to initial, indicating a possible reduction in data variability in the final test for posteromedial aspect. There is a significant decrease in the coefficient of variability from initial testing (13.81%) to final testing (11.34%), suggesting less relative variation of data relative to the mean in final testing. The standard error of the mean for the difference between the tests is reduced (0,76), which may indicate greater precision in estimating the mean for this difference between the initial and final tests.

Table 6 Statistical calculation- Control Group -Test *Y* – Balance

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CONTROL GROUP-TEST *Y* – BALANCE-POSTEROMEDIAL

Statistical indicators	Initial testing	Final test	The difference between the testers
Averange	97,31	99,25	1,94
Standard deviation	13,68	13,63	0,80
Coefficient of variability	14,06	13,73	41,40
Maximum	115,00	118,00	41,40
Minimum	13,68	13,63	0,80
Standard Error of the Mean	3,42	3,41	0,20

There is an increase in the mean from initial testing (97.31) to final testing (99.25) for posteromedial appearance in the control group, the difference being 1.94. This indicates a slight improvement in performance in the Y-Balance test between the two test times for this specific aspect in the control group. Standard deviation appears to be similar between the two test times in the control group. A moderate decrease in the coefficient of variability from initial (14.06%) to final (13.73%) testing is observed, suggesting less relative variation of data from mean in final testing for posteromedial appearance in the control group. The standard error of the mean for the difference between tests is reduced (0,20), which may indicate greater precision in estimating the mean for this difference between the initial and final tests in the control group.
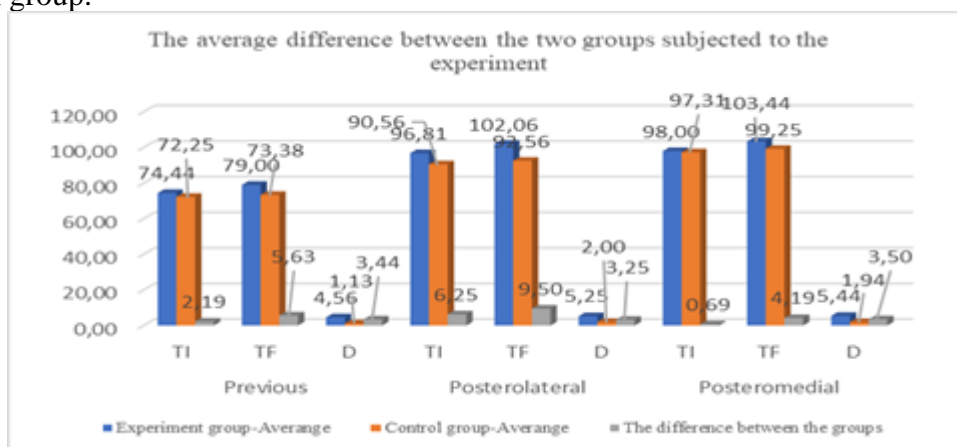

Fig. 7 The mean difference between the two experimental groups--Test Y - Balance

On average, both the experiment and control groups had an increase in performance from initial (TI) to final (TF) testing in the Y-Balance-Previvous test. However, the mean difference between the two groups (experiment and control) is 3.44. This difference suggests that there is a significant difference between the increase in performance in the Y-Balance test in the experiment group compared to the control group. For posterobilateral, the mean difference (TF - TI) for the experiment group is 9.50. The mean difference (TF - TI) for the control group is 6.25. These data indicate that in the posterolateral evaluation of the Y-Balance test, both groups

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(experiment and control) showed an improvement in performance from initial (TI) to final (TF) testing. However, the average difference between the two groups in terms of performance improvement (D) is 3.25. This suggests that there is a significant difference in performance improvement within the Y-Balance test for posterolateral appearance between the experiment group and the control group, with a larger difference in the experiment group. For posteromedial the mean difference (TF - TI) for the experiment group is 4.19. The mean difference (TF - TI) for the control group is 0.69. These data indicate that, in the posteromedial evaluation of the Y-Balance test, both groups (experiment and control) saw an improvement in performance from initial (IT) to final (TF) testing. However, the average difference between the two groups in terms of performance improvement (D) is 3.50. This suggests that there is a significant difference in performance improvement in the Y-Balance test for posteromedial appearance between the experiment group and the control group, with a larger difference in the experiment group.

Discussions

This study [9] investigated equilibrium capacity using two test instruments: the Y-balance test (YBT), an existing clinical method, and an automated version of it called the dynamic equilibrium test (DBT), developed as part of this research. For this study, 32 healthy adult men, aged about 20 years, were randomly assigned to two groups, YBT and DBT, in order to compare their balance capacity. The variables measured included the maximum stretching distances of both legs in the anterior (AT), posteromedial (PM), and posterolateral (PL) directions. Another study identified by results moderate relationships between FMS and YBT screens and physical performance tests (e.g., SLJ, VJ, and Pro Agility test) in both men ($p < 0.05$) and women ($p < 0.05$). Women outperformed men on both FMSTM and YBT tests, while men outperformed women in measuring physical performance [10]. The study aimed to investigate whether a three-week TRX suspension training program could improve the static balance of young basketball players [7]

Conclusions: Studies in the field emphasize that teacher orientation, intervention at the appropriate time for the message to be correctly received by the student and the use of modern concepts and theories can influence the evolution and success in the process of learning and practicing sports activities. The Y-Balance test was the assessment tool for balance, measuring aspects such as anterior, posterolateral and posteromedial balance. This test provided relevant data on the ability to maintain balance, essential in coordinating movements and relevant in the context of playing basketball. Weekly basketball practice in the experimental group led to significant improvements in balance abilities, especially in posterolateral and posteromedial aspects, compared to the control group that followed only the regular curriculum.

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