Forum for Education Studies 2024, 2(3), 1418.
https://doi.org/10.59400/fes.v2i3.1418

Article

Benchmarking analysis at establishing a culture of wellness

Ignatova Darinka[1,*], Dimitrova Bistra[2,*], Iliev Alexander[3,*], Angelova Petya[4,*]

[1] Department for Information and In-Service Training of Teachers, Sofia University "St. Kliment Ohridski", Sofia 1000, Bulgaria
[2] Department of Aquatic Sports, National Sports Academy "Vassil Levski", Sofia 1000, Bulgaria
[3] Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, Sofia 1000, Bulgaria
[4] Department of Physical Education and Sport, Trakia University, Stara Zagora 6000, Bulgaria
*** Corresponding authors:** Ignatova Darinka, dignatova@diuu.uni-sofia.bg; Dimitrova Bistra, dimitrova.bistra@yahoo.com; Iliev Alexander, al.iliev@math.bas.bg; Angelova Petya, petya.angelova@trakia-uni.bg

CITATION

Darinka I, Bistra D, Alexander I, Petya A. Benchmarking analysis at establishing a culture of wellness. Forum for Education Studies. 2024; 2(3): 1418. https://doi.org/10.59400/fes.v2i3.1418

ARTICLE INFO

Received: 3 June 2024
Accepted: 12 July 2024
Available online: 14 August 2024

Abstract: This article aims to establish trends in motor development through basketball activities as a prerequisite for building a wellness culture, revealing the impact of basketball exercises on motor activity in junior high school. The interests of the research are aimed at following the dynamics in the motor potential and establishing and evaluating the presence of wellness within the framework of school physical education. More specifically, the creation of a culture of wellness in the junior high school stage of the educational degree. A reliable and objective toolkit for diagnosing the level of motor potential in 12–14-year-old students was selected and applied, specifying the empirical data from the conducted research. The purpose of the research is to follow the dynamics of the motor potential in the two stages of research and to establish a wellness culture in the junior high school stage of the educational degree in the lesson of physical education and sports, based on a comparative analysis of the dynamics of motor indicators in the two cognitive stages of the study. Through legislative changes in school education, the direction "school health", in particular the expected competences, is regulated. Key competence #9 requires knowledge and skills for sustainable development, implementation of a healthy lifestyle, and sports in the Bulgarian school. To achieve the goal, the following research tasks are solved: experimentation of a basketball training program aimed at the development of motor qualities, as a result of which the dynamics in the development of motor qualities of students studying basketball in physical education and sports classes. Based on the benchmarking analysis, it can be concluded that the results achieved at baseline show an improvement in the motor condition of the studied contingent. Motor indicators show intense dynamics in 12–14-year-old students, modeling their motor potential and confirming the presence of a wellness culture in the Bulgarian school. It can be summarized that a benchmarking analysis was carried out to establish dynamics in the indicators and the manifestation of motor skills between the students of the 4th and 5th grade, allowing the individualization of the differences in the motor potential between the empirical data in the cognitive stages of the study.

Keywords: wellness culture; basketball; motor development; motor potential; motor activity; motor capacity

1. Introduction

In every pedagogical activity, students are subject to continuous evaluation based on comparative analyses of certain achievements and results—benchmarking analyses [1,2]. It is important that modern assessment tools are objective and allow the representation of a standard [3–6]. Traditionally, regulatory requirements have a dynamic nature, which allows for change depending on social conditions [7–9]. The results of the experimental study reflect the current state of motor activity in the

monitored contingent. They are a complex indicator of the activity of the teacher in the PES lesson [10–12]. For the state of motor activity, in sports-pedagogical practice it is accepted to judge by establishing a level in the development of motor capacity [13–15]. Based on the collected empirical material, a comparative analysis was carried out according to pre-assigned tasks in the PES lesson, and key conclusions from the research were drawn. It can be concluded that the motor condition of the studied contingent is improving. The motor indicators show intense dynamics, modeling the motor potential and confirming the presence of a wellness culture in the Bulgarian school. The individualization in the differences of the motor potential between the empirical data in the cognitive stages of the study is the basis for the presence of the wellness culture in the junior high school stage of the Bulgarian school.

2. Material and methods

The present study was conducted during the academic year (2022–2023). Motor activity of 40 students—research contingent, divided equally into two target groups—control and experimental with 20 students in each, was tracked. The research contingent was aged 12–14 from a metropolitan high school. The purpose of the study is to track dynamics in motor potential at the beginning and end of the research period and establish a wellness culture in the junior high school stage of the educational degree in the PES lesson based on a benchmarking analysis in the dynamics of motor indicators in the two cognitive stages of the study. The tracked levels of motor development determine the average values of the investigated indicators, and the established dynamics in the tracked empirical data are the basis for justifying the existence of a wellness culture in junior high school. Indicators allowing harmonization and individualization of motor potential differences between the collected empirical data from the two cognitive periods were analyzed. Scientifically based conclusions will establish the presence or absence of dynamics in motor capacity. Measurement of motor potential was carried out in the period 1 September 2022—30 June 2023. To establish the relationship between the indicators, a benchmarking analysis of dynamics in the indicators was applied through mathematical-statistical processing to derive coefficients of variation. To achieve the goals, an objective test methodology was used to measure and evaluate motor capacity. Synthesized in three stages, proceeding sequentially, the following research tasks were solved:

The first stage—ascertaining experiment—includes the selection of means and methods, the formation of a research contingent, and specifying a place for performing the experiment.

The second stage—formative experiment—covers the time for experimental work. Training sessions are held once a week. Before the beginning of the research part, testing was carried out on motor activity tests set in the study. A total of 40 junior high school students, divided into two target groups, took part in the experiment. The group of basketball practitioners—an experimental target group—was formed by 20 students (10 boys and 10 girls) engaged in an established curriculum. Taking indicators and grouping results separately for both genders in order to track gender differentiation.

Third stage—pedagogical experiment—in this stage motor tests were conducted on control and experimental groups. The results were processed mathematically and statistically and analyzed. Ability to report the motor capacity of basketball players, as well as to draw some basic conclusions and recommendations for practice.

In order to obtain information about basic motor qualities, the following tests were used: running 30 meters; 200-meter shuttle run; long jump from a standing position with two feet; standing high jump. In sports-pedagogical practice, the state of motor activity is evaluated by the level of development of motor qualities. A characteristic of motor activity is that it is a measurable activity using objective criteria, which determines control and management in the desired direction. Based on the obtained results, a quantitative and qualitative assessment is made, depending on the task set. Indicators in assessing motor capacity for speed, which is a complex, multi-structural motor quality. In the conducted research, we measured with the test "Running 30 m from a high start"—**Table 1**.

Table 1. Running 30 m from a high start (sec)—boys.

Measurement	First measurement	First measurement	Second measurement	Second measurement	Difference
Group	$\overline{X}$	S	$\overline{X}$	S	d
Control group	12	0.8	11.9	0.7	0.1
Experimental group	11.4	0.7	11.1	0.6	0.3
Difference	0.6	-	0.8	-	-
t-criteria	1.8	-	2.7	-	-
P (probability)	$P < 95\%$	-	$P > 95\%$	-	-

At the start of the study, the tracked contingent registered identical motor capacity for speed on a 30-meter smooth run. The obtained differences of the average values at the first measurement are unreliable: $P < 95\%$, which speaks of equal possibilities.

- t_1—first measurement—1.8 and $P < 95\%$;
- t_2—the second measurement—2.7, which proves that $P > 95\%$.

As a result of basketball training, within 34 hours of training, there were significant changes in the experimental group—$P < 95\%$. Before the experimental period, the mean value was 11.4 s, and after the experiment it was 11.1 s. The average value has decreased by 0.3 sec. This shows that from experimental group they improved their results i.e. basketball training has had a positive impact on endurance. The same motor test was used to study the development of quality speed in girls for both target groups—**Table 2**.

Table 2. Running 30 m from a high start (sec)—girls.

Measurement	First measurement	First measurement	Second measurement	Second measurement	Difference
Group	$\overline{X}$	S	$\overline{X}$	S	d
Control group	12.9	1	12.8	1.2	0.1
Experimental group	12.6	0.9	12.3	0.9	0.3
Difference	0.3	-	0.5	-	
t-criteria	0.71	-	1.06	-	-
P (probability)	$P < 95\%$	-	$P > 95\%$	-	-

At the beginning of the study, at the first measurement, $P < 95\%$, which speaks of equal opportunities for all girls.

- t_1—first measurement—0.71 and $P < 95\%$;
- t_2—the second measurement—1.06, which proves that $P > 95\%$.

At the end of the study, we found that basketball training did not significantly affect the girls of the experimental group for this motor indicator.

The test conducted for boys 200-meter shuttle run from both target groups shows the following results—**Table 3**.

Table 3. 200 meter shuttle run (sec)—boys.

Measurement	First measurement	First measurement	Second measurement	Second measurement	Difference
Group	$\overline{X}$	S	$\overline{X}$	S	d
Control group	51	2.4	50.8	2.3	0.2
Experimental group	49	2.6	48.3	2.1	0.7
Difference	2	-	2.5	-	-
t-criteria	1.49	-	2.55	-	-
P (probability)	$P < 95\%$	-	$P > 95\%$	-	-

From the first measurement, boys from both target groups have the same motor capabilities:

$P < 95\%$, and after the basketball training, $P > 95\%$.

- t_1—first measurement—1.49 and $P < 95\%$;
- t_2—the second measurement—2.55, which proves that $P > 95\%$.

Credible changes occurred in an experimental group. Before the experiment, the average value was 49 s, and after the experiment it was 48 s. The decrease of the average magnitude by 0.7 sec. proves that basketball is a suitable means of developing endurance. The test conducted for girls from both target groups shows the following results—**Table 4**.

Table 4. 200 meter shuttle run (sec)—girls.

Measurement	First measurement	First measurement	Second measurement	Second measurement	Difference
Group	$\overline{X}$	S	$\overline{X}$	S	d
Control group	53	3.2	52.4	3.1	0.6
Experimental group	52.2	3	51.3	2.9	0.9
Difference	0.8	-	1.1	-	-
t-criteria	0.58	-	0.82	-	-
P (probability)	$P < 95\%$	-	$P > 95\%$	-	-

The girls from both target groups registered a decrease in the mean values of—the mean arithmetic value for the control group. The difference in the control group is 0.6 sec., and in the experimental group 0.9 sec.

- t_1—first measurement—0.58 and $P < 95\%$;
- t_2—the second measurement—0.82, which proves that $P > 95\%$.

According to the studied indicator, gender differences are in favor of boys. The

information from the "Long jump" test—indicator for measuring the explosive force of the lower limbs—**Tables 5** and **6**.

Table 5. Long jump (cm)—boys.

Measurement	**First measurement**	**First measurement**	**Second measurement**	**Second measurement**	**Difference**
Group	$\overline{X}$	S	$\overline{X}$	S	d
Control group	130.5	4.4	137	3.8	6.5
Experimental group	130.7	4.9	142.7	3.6	12
Difference	0.2	-	5.7	-	-
t-criteria	0.1	-	3.43	-	-
P (probability)	$P < 95\%$	-	$P > 95\%$	-	-

Table 6. Long jump (cm)—girls.

Measurement	**First measurement**	**First measurement**	**Second measurement**	**Second measurement**	**Difference**
Group	$\overline{X}$	S	$\overline{X}$	S	d
Control group	121.4	5	127	4.7	5.6
Experimental group	121.6	5.2	132	4	10.4
Difference	0.2	-	5	-	-
t-criteria	0.09	-	2.56	-	-
P (probability)	$P < 95\%$	-	$P > 95\%$	-	-

From the first measurement, it was found that the average values of boys in the experimental group were = 130.7 cm. After conducting the experiment and retaking the indicators, it was found that the results were improved. The average value at the second measurement is now = 142.7 cm, with a standard deviation S = 3.6 cm and a coefficient of variation V% = 2.5%.

- t_1—first measurement—0.1 and $P < 95\%$;
- t_2—second measurement—3.43, which proves that $P > 95\%$.

This gives reason to claim that basketball leads to an improvement in the speed-power capabilities of the lower limbs. **Table 6** shows the results of a test conducted on girls.

At the beginning of the study, girls from the control and experimental groups have the same abilities: $P < 95\%$, and after the basketball training, $P > 95\%$.

- t_1—first measurement—09 and $P < 95\%$;
- t_2—the second measurement—2.56, which proves that $P > 95\%$.

Credible changes occurred in an experimental group. For the experimental group, the first measurement was 121.6 cm, and after the experiment, it was 132 cm. The difference of 5.6 cm compared to the experimental group—10.4 cm—defines the experimental program as reliable in the development of motor abilities. Bounce-ability as a complex motor quality is determined by the ability of the examined person to perform speed-force movements in a horizontal, vertical, or mixed plane and is related to overcoming the weight of the body. It depends to a large extent on the musculature of the lower limbs, as well as on the activity of swinging movements of the hands. Through the "High Jump from a Place" test, we tracked how the explosive power of

the lower limbs changes after applying basketball elements—**Tables 7** and **8**.

Table 7. High jump from a place (cm)—boys.

Measurement	First measurement	First measurement	Second measurement	Second measurement	Difference
Group	$\overline{X}$	S	$\overline{X}$	S	d
Control group	21.2	1.2	23.8	1.7	2.6
Experimental group	21.3	1.5	26.7	1.6	5.4
Difference	0.1	.	2.9	.	.
t-criteria	0.16	.	3.92	.	.
P (probability)	$P < 95\%$	.	$P > 95\%$	.	.

Table 8. High jump from a place (cm)—girls.

Measurement	First measurement	First measurement	Second measurement	Second measurement	Difference
Group	$\overline{X}$	S	$\overline{X}$	S	d
Control group	20.5	1.9	22.7	2	2.2
Experimental group	20.6	1.7	24.2	1.5	3.6
Difference	0.1	-	1.5	-	-
t-criteria	0.12	-	1.88	-	-
P (probability)	$P < 95\%$	-	$P > 95\%$	-	-

- t_1—first measurement—0.16 and $P < 95\%$;
- t_2—second measurement—3.92, which proves that $P > 95\%$.

These results are analogous to those obtained from the Long Jump test, i.e., an improvement in the explosive power of the lower limbs was registered. This gives us reason to claim that basketball training improves motor skills in the conditions of a properly organized learning process.

The difference in average value of the two measurements in the control group is d = 2.2 cm, and in the experimental group d = 3.6 cm.

- t_1—first measurement—0.12 and $P < 95\%$;
- t_2—the second measurement—1.88, which proves that $P > 95\%$.

In both cases, $P < 95\%$. In this motor test, the advantage is in favor of the boys.

3. Results

Benchmarking-analysis of the data found that the indicators carrying information about the studied motor activity in the conducted experimental study at the baseline level reported an improvement to a significant extent. According to the mathematical-statistical methods described in the research, including benchmarking-analysis, to determine average values and deviations of the indicators, a variation analysis was applied with the calculation of average statistical parameters to establish dynamics in tracked indicators, as follows:

- X—arithmetic mean value;
- S—mean-square deviation;
- V%—coefficient of variation;

$$V = \frac{S}{\bar{X}} \times 100(\%)$$

Sample distribution makes it possible to compare the variation of different traits. It is used to assess the homogeneity of the sample:

- The dispersion of the sign is small (the sample is uniform), with values between 10%–12%.
- Between 10%–30% the sample is roughly uniform.
- Above 30%, the scatter is large (the sample is highly heterogeneous).
- S—standard deviation—the most precise measure of dispersion. It describes the degree of deviation of the values of the variable from the arithmetic mean. It is determined by the equation:

$$S = \sqrt{\frac{\Sigma(x_1 - \bar{x})^2}{n-1}}$$

where: Σ*x*—sum of the values; X_i—each value of the variable in the sample; *n*—volume of the sample; *d*—mean value difference.

It was established that, in a theoretical aspect, the theory for the development of the basic motor qualities of the 5th grade students practicing basketball exercises was not sufficiently developed. Regarding the development of motor qualities, more significant changes were observed in the boys in the experimental group. Boys at this age are better in terms of running speed, speed-power capabilities, and endurance, and girls have more pronounced motor quality flexibility. The applied basketball program leads to effective development of motor skills.

Practical recommendations: Regular updating and improvement of motor activity through basketball exercises of 4th and 5th grade students. Implementation in practice of the proposed, developed, and experimented basketball program in the 5th grade curriculum.

4. Discussion

The multi-layered motor potential in the age aspect shows an uneven and continuous deployment of motor activity. It was found that, in terms of the development of motor skills, more significant changes were observed in the boys in the experimental target group. Boys in the tracked age range are better in speed, speed-power capabilities, and endurance. Girls show better development in flexibility. The applied basketball program leads to effective development of motor skills, confirming school wellness in the Bulgarian school.

5. Conclusions

Based on the benchmarking analysis of the above data, it can be concluded that the results achieved at the initial level show that the motor condition of the studied contingent is improving. Motor indicators exhibit intense dynamics in 12–14-year-old students, modeling their motor potential and confirming the presence of a wellness culture in the Bulgarian school. It can be summarized that a benchmarking analysis was performed to establish dynamics in indicators and manifestation of motor skills between 4th and 5th-grade students, allowing individualization in motor potential

differences between empirical data in the cognitive stages of the study. A wellness culture in the junior high school stage of the Bulgarian school has been established.

Author contributions: Conceptualization, ID, and DB; methodology, AP; software, IA; validation, ID, DB and IA; formal analysis, AP; investigation, IA; resources, DB; data curation, IA; writing-preparation of the original draft, AP; writing—review and editing, DB; visualization, ID; supervisor, ID; project administration, ID; procurement of funds DB. All authors have read and agree to the published version of the manuscript.

Conflict of interest: The authors declare no conflict of interest.

References

1. Ignatova D, Iliev A. Benchmarking for Development of Speed and Power Characteristics, Scientific and methodical magazine. Strategies for Policy in Science and Education-Strategii na Obrazovatelnata i Nauchnata Politika. 2022; 30(4): 411–421. doi: 10.53656/str2022-4-6-ben
2. Dimitrova B, Izov N, Alexandrova V, et al. Smart kognitiven instrumentarium. Vŭnshna otsenka na profesionalni kompetentsii za kadri v Nishov turizŭm. NSA Press; 2021. p. 110.
3. Dimitrova B. Relationships between education and innovations in the recreational Industry in Bulgaria. Trakia Journal of Sciences. 2020; 18(2): 143–149. doi: 10.15547 / tjs.2019.02.007
4. Nesheva I. A Wellness Tool to Perform Healthy Lifestyle Practices in the Bulgarian School System. Strategies for Policy in Science and Education-Strategii na Obrazovatelnata i Nauchnata Politika. 2023; 31(5): 560–572. doi: 10.53656/str2023-5-7-wel
5. Nesheva I. Social benefits of wellness motor activities for women with normal pregnancy. International Scientific Journal: Smart Innovations in Recreational, Wellness Industry and Niche Tourism. 2022; 4(1–2): 22–27.
6. Nesheva I. Study of Results Between Initial and Final Specific Tests in Women with Normal Pregnancy. Trakia Journal of Sciences. 2019; 17(2): 135–142. doi: 10.15547/tjs.2019.02.006
7. Ignatova D. Motor activity based on learning – contemporary trends in school wellness. Smart Inovattions in Recreative & Wellness Industry and Niche Tourisum - Scientific Journal. 2023; 5(1-2): 22-26.
8. Ignatova D. Implementation of motor complexes based on specialized application system blaze-pod trainer. Bulgarian Educational Journal, Strategies for Policy in Science and Education. 2023; 31(6): 653–667.
9. Ignatova D. Study the influence of yoga specialised practices on the Formation of correct body posture and corrections of spinal Deformities. Smart Inovattions in Recreative & Wellness Industry and Niche Tourisum - Scientific Journal. 2023; 4(1-2): 17-22.
10. Ignatova D. Affirming Wellness Culture through Innovative Methodology Related to Blaze-Pod Trainer System. Strategies for Policy in Science and Education. 2023; 31(2): 212–225. doi: 10.53656/str2023-2-7-aff
11. Ignatova D. Specificity of the motor potential for achieving Scholar Wellness, Trakia Journal of Sciences. Trakia University; 2021. pp. 867–873. doi:10.15547/tjs.2021.s.01.136
12. Ignatova D. The effects of swimming on preschool children with spinal abnormalities. In: Proceedings of the 17th International Balkan Society for Pedagogy and Education /BASOPED/ Conference; 2018. pp. 207–212.
13. Ignatova D, Iliev A. Current methods and models combining nutritional regimes with motor activity, Recreation, Wellness Industry and Niche Tourism. International Scientific Journal for Smart Innovations. 2023; 05(1–2): 8–14
14. Nesheva I. Pregnancy and wellbeing. Trakia Journal of Sciences, Sofia. 2023; 21: 231-235. doi:10.15547/tjs.2023.s.01.039
15. Nesheva I. Cheerleading – a tool to achieve wellness culture in the Bulgarian school. Scientific notices, Bulletin "Heritage BG" Year II. 2022; 3(11): 90-97.