

MENTAL ENLIGHTENMENT SCIENTIFIC –
METHODOLOGICAL JOURNALMENTAL ENLIGHTENMENT SCIENTIFIC –
METHODOLOGICAL JOURNAL<http://mentaljournal-jspu.uz/index.php/mesmj/index>THE EFFECTIVENESS OF THE “VESKORQ” DIAGNOSTIC SYSTEM AND A
SPECIAL METHODOLOGY IN DEVELOPING BALANCE ABILITY IN 10-12-
YEAR-OLD JUDOKAS**Mirshod Akmuradov***Independent researcher, Scientific Research**Institute of Physical Culture and Sport**E-mail: akmuradovmirshod9@gmail.com**Tashkent, Uzbekistan*

ABOUT ARTICLE

Key words: balance ability, dynamic balance, vestibular apparatus, judo, “VESKOR-Q”, balance efficiency index (MSI), coordination, sensorimotor integration, pedagogical experiment, sensitive period, technical readiness, correlation analysis.

Received: 20.09.26**Accepted:** 21.09.26**Published:** 22.09.26

Abstract: This article examines the effectiveness of the “VESKOR-Q” vestibular-coordination diagnostic system and the author's special exercise methodology in developing balance ability in 10-12-year-old judokas. In contact combat sports such as judo, the ability to maintain balance is one of the key factors determining the accuracy and stability of technical actions, yet diagnostic tools capable of quantitatively measuring this ability with regard to the specifics of the sport remain insufficiently developed. The study involved 48 judokas aged 10-12, divided into an experimental group (n=24) and a control group (n=24). The “VESKOR-Q” system measures dynamic balance across three anatomical planes (horizontal, vertical, sagittal) and calculates a single integral indicator — the balance efficiency index (MSI); the metrological reliability of the system has been established ($r=0.87$). At the end of a nine-month pedagogical experiment, the indicators of the experimental group improved by an average of 19.54%, compared with 10.47% in the control group ($P<0.01-0.001$). Correlation analysis revealed a strong relationship between balance ability and technical readiness. The obtained results statistically confirm the significant superiority

Introduction. In modern children's and youth sports, the objective measurement and digital assessment of an athlete's motor qualities is gaining increasing importance. In combat sports, particularly judo, the ability to maintain balance is directly related to the quality and stability of technical actions and to injury prevention [1; 3]. Every phase of a technical action — unbalancing the opponent (kuzushi), the throw (nage-waza), and control (katame-waza) — requires the athlete's own ability to control balance.

From the standpoint of age-related characteristics, 9-12 years is considered a sensitive period for developing balance and coordination abilities [2; 5]. The scientific validity of the methodological tools applied during this period determines the foundation of future sporting achievements. At the same time, standardized methods widely used in international practice (the Y Balance Test, the Star Excursion Balance Test) do not fully reflect dynamic movements under the vestibular-stimulation conditions specific to judo, while the national sports science literature contains virtually no diagnostic tools adapted to this discipline for the quantitative assessment of this ability.

Proceeding from this, the purpose of this article is to determine, through a pedagogical experiment, the effectiveness of the “VESKOR-Q” diagnostic system developed for assessing balance ability in 10-12-year-old judokas, together with the special exercise methodology based on it.

Materials and methods. The study involved 48 judokas aged 10-12 from the beginner training groups (3rd category) of Sport School No. 2 of the Bektemir district, Tashkent city. Under equal conditions, they were divided into an experimental group (EG, n=24) and a control group (CG, n=24). At the beginning of the experiment, no statistically significant difference was found between the groups on any indicator ($P>0.05$), which ensured the methodological validity of the study.

The main measuring instrument was the “VESKOR-Q” vestibular-coordination diagnostic system developed by the author. After a signal, the system records the accuracy of reaching the target after rotation (B), the number of rotations (A), and the time spent (T), on the basis of which it calculates a single integral indicator — the balance efficiency index ($MSI = (A+B)/T$). Measurements are carried out in the horizontal, vertical, and sagittal planes. The metrological reliability of the system was established through a three-day repeated test involving 20 athletes (test-retest coefficient $r=0.87$), and it has been officially registered as a copyright object (No. 009827, January 27, 2026).

The athletes' readiness was assessed using nine indicators: static balance (statometry), dynamic balance (VESKOR-Q - three planes), attention stability (Schulte table), and technical readiness (execution time of the O-Goshi and Seoi-Nage techniques).

The author's methodology applied in the experimental group consisted of 20 special dynamic-balance exercises divided by complexity into three groups, 4 competition-format vestibular-activation games, and 8 movement games according to F.A. Kerimov's classification. Training sessions were held for 9 months, three times a week, 90 minutes each; 15 minutes per session were devoted to balance exercises, with the load gradually increased from 5 to 15 seconds. The control group trained according to the traditional program.

The obtained data were processed using mathematical-statistical methods (arithmetic mean, standard deviation, coefficient of variation, Student's t-test, $p < 0.05$) and Pearson correlation analysis.

Result and discussion. The baseline indicators of both groups at the start of the experiment are presented in Table 1. The differences between the groups were not statistically significant ($P > 0.05$), confirming that they were at the same initial level.

Table 1. Baseline indicators of the EG and CG at the start of the experiment

Indicator	EG (M)	CG (M)	t	P
Statometry-1 (s.)	7.39	7.51	0.30	>0.7
Statometry-2 (s.)	7.62	7.52	0.25	>0.8
Statometry-3 (s.)	29.08	28.11	0.62	>0.5
VESKORQ-horizontal (MSI)	5.91	6.07	0.52	>0.6
VESKORQ-vertical (MSI)	5.73	5.64	0.29	>0.7
VESKORQ-sagittal (MSI)	6.60	6.45	0.45	>0.6
Schulte (s.)	71.20	68.73	0.65	>0.5
O-Goshi (s.)	19.59	20.03	0.39	>0.6
Seoi-Nage (s.)	20.61	21.38	0.68	>0.4

At the conclusion of the nine-month experiment, statistically significant improvement was recorded in the experimental group across all indicators ($P < 0.01$ - $P < 0.001$). The relative gains of the two groups are compared in Table 2.

Table 2. Relative increase (RI, %) of the EG and CG at the end of the experiment

Indicator	EG: RI (%)	CG: RI (%)	P (EG)
Statometry-1 (s.)	20.14	10.53	<0.01
Statometry-2 (s.)	17.24	9.61	<0.01
Statometry-3 (s.)	26.85	12.80	<0.001
VESKORQ-horizontal (s.)	18.32	9.52	<0.01
VESKORQ-vertical (s.)	17.86	10.44	<0.01
VESKORQ-sagittal (s.)	16.84	9.45	<0.01

Indicator	EG: RI (%)	CG: RI (%)	P (EG)
Schulte (s.)	17.36	10.23	<0.01
O-Goshi (s.)	22.74	11.44	<0.001
Seoi-Nage (s.)	18.49	10.20	<0.001
Average	19.54	10.47	—

As Table 2 shows, the average improvement of indicators in the experimental group amounted to 19.54%, nearly twice as high as in the control group (10.47%). The relative difference between the groups in favor of the experimental group was 9.07%. The increase in the MSI index, representing dynamic balance, ranged from 16.84-18.32% across the three planes ($P<0.01$), indicating that the methodology exerted an equally strong effect in all three planes. Technical readiness indicators (O-Goshi, Seoi-Nage) improved by 18.49-22.74% ($P<0.001$).

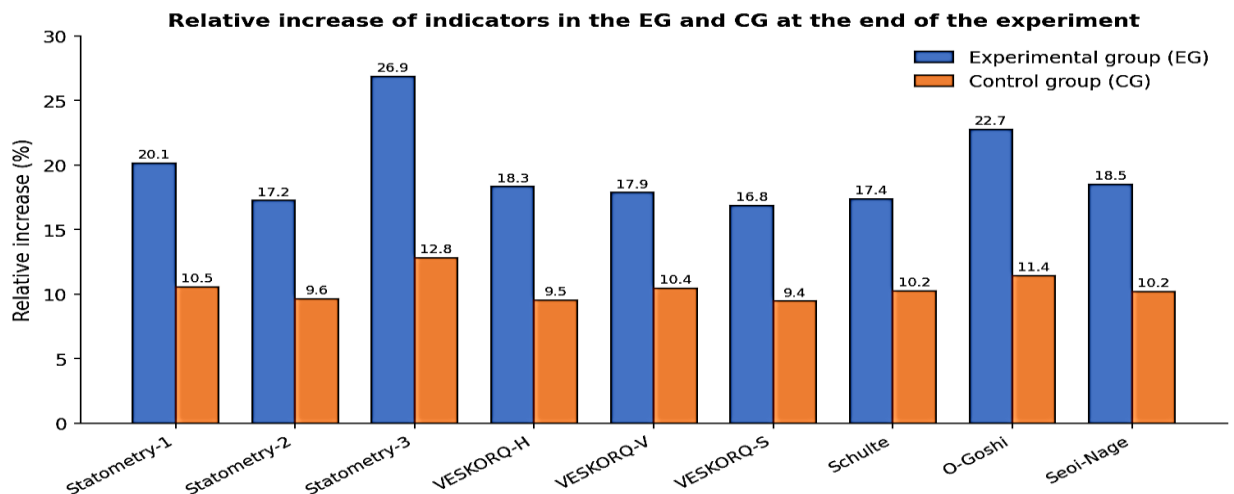


Figure 1. Relative increase indicators of the experimental and control groups at the end of the experiment

Pearson correlation analysis was conducted to determine the relationship between indicators. The three planes of the "VESKORQ" system showed strong mutual correlation (horizontal-sagittal $r=0.904$; $p<0.001$), confirming the internal consistency of the system. A strong negative correlation was found between dynamic balance (MSI) and the time required to perform technical techniques (e.g., VESKORQ sagittal - O-Goshi: $r=-0.742$; $p<0.001$). Since the technical tests were measured in time (seconds), this negative relationship carries a positive practical meaning: the higher the dynamic balance, the faster and more effectively the technical techniques are performed.

The results obtained are theoretically explained by interpreting balance as the sensorimotor integration of vestibular, proprioceptive, and visual afferentation: at ages 9-12, the high adaptability of the vestibular apparatus responds rapidly to special stimulation exercises. This substantiates the high effectiveness of the author's methodology and

demonstrates that, unlike standard tests (YBT, SEBT), the "VESKORQ" system is capable of objectively assessing judo-specific dynamic movements.

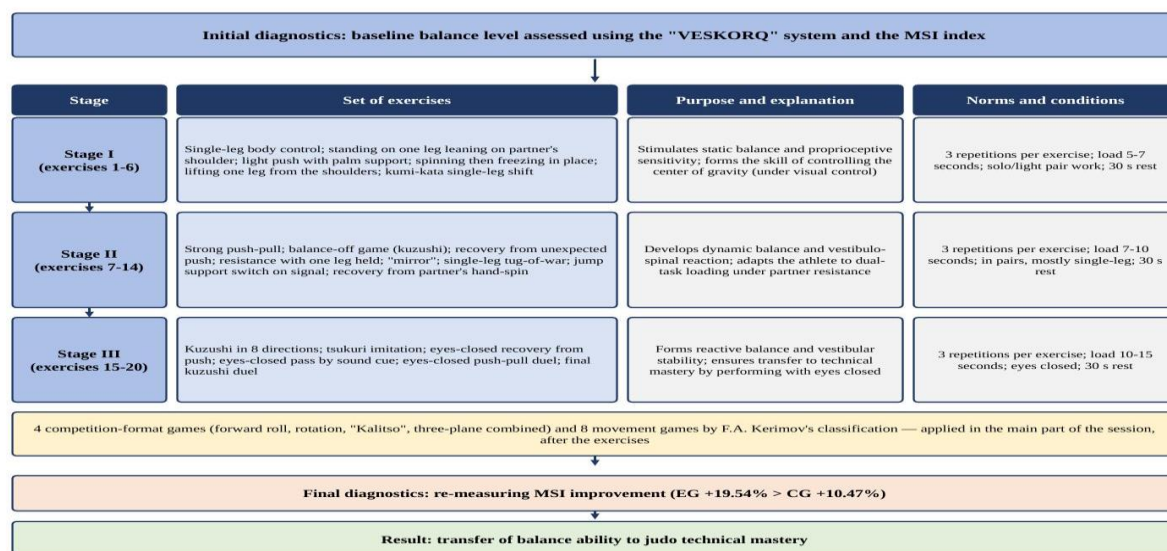


Figure 2. Model of the author's methodology: diagnostics, the three-stage set of exercises and games, and reassessment

Conclusion

1. The developed "VESKORQ" diagnostic system makes it possible to objectively assess the dynamic balance of 10-12-year-old judokas across three anatomical planes; its metrological reliability ($r=0.87$) has been established.

2. The single integral indicator — MSI — reduces balance efficiency to an objective, repeatable, and comparable numerical value.

3. A nine-month experiment based on the author's methodology (20 exercises, 4 games, and 8 movement games) increased the indicators of the experimental group by an average of 19.54% (10.47% in the control group) ($P<0.01-0.001$).

4. Correlation analysis empirically confirmed the direct relationship between balance ability and technical readiness. It is therefore advisable to introduce the "VESKORQ" system and the special methodology into the practice of sports schools.

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