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Scientific conditions for using measurement and testing in elite sports training.

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Research Summary:

Measurement and testing in sports are fundamental to developing athletic performance, especially competitive athletic performance, which always strives to achieve high-level athletic accomplishments.

From Guligord's perspective, measurement means describing data in numerical form. This, in turn, opens up the many advantages that result from dealing with numbers and computational thinking. Campbell views measurement as: assigning numbers to objects or events according to specific rules.

Nunnally defines measurement as: the rules for using numbers (or numerals) to represent things in a way that indicates quantitative quantities of a characteristic or property. (Muhammad Hasan Alawi - Muhammad Nasr al-Din Radwan: 2008, p. 18)

Mehrens (1975) believes that the measurement process is the process that enables a specialist to obtain quantitative information about a phenomenon (Ahmed Abdel Latif Abu Al-Saad, 2009, p. 11).

Keywords: measurement, testing, scientific conditions, elite sports training.

1- The research problem:

Since the phenomenon of individual differences is one of the most widely used phenomena in life, interactions between people, judgment of individuals, learning, guidance, treatment, work, acceptance, behavior, etc., are all subject to individual differences. This may occur automatically, or it may be based on conscious studies.

People differ from one another in terms of mental abilities, personality traits, physical measurements, aptitudes, tendencies, tendencies, and physical performance. When we attempt to explain, measure, and classify these differences, we are subjecting the phenomenon of individual differences to study and research. (Muhammad Subhi Hassanein: 1996, p. 20).

There are two types of measurement (Robert Thorndike and Elizabeth Higgin, 1989):

The first is to measure the characteristic or property directly, without having to measure its resulting effects in order to identify it. For example, you measure the length of a building using a meter, a cubit, or a yard, etc. You also measure the height of a person using a meter, a cubit, or a yard. The weight of an animal is measured in kilograms, grams, pounds, etc. (Sami Muhammad Malham: 2011, p. 32).

The second method is to measure a trait or characteristic indirectly, measuring its effects in order to arrive at the quantity of the trait or characteristic being measured. For example, if you wanted to measure the intelligence of a child, Ahmed, who is in the fourth grade of primary school, you would design a special intelligence test and administer it to this child, or you would use a standardized intelligence test. Then, from the results of the test, you would conclude that Ahmed's intelligence is, for example, 110. (Sami Muhammad Malham: 2011, p. 33).

Our question in this article is: What are the scientific conditions for using measurement and testing in elite sports training?

2- Requirements and conditions for measurement and testing in elite sports training:

Regarding the conditions that must be met in the measurement process, they include:

* Constructive validity of what is being measured, i.e., the term must clearly indicate that the construct is closely related to the decision being made.

* The importance of establishing concurrence and predictive validity in constructing the test, and it must be conducted on a population completely similar to the one being measured.

* Complete validity of the results. Regardless of the difference in data collection methods, whether through personal interviews, case studies, or previous history, the data must be reliable. (Mohamed Al-Arabi Shamoun: 1999, p. 26)

* Sources of measurement error must be minimized as much as possible, or they must be accounted for in interpreting the results to make the best possible decisions.

* Results emerging from the basic information for measurement must be used in a valid, clear, and concise manner, and placed within a specific context within the field. (Mohamed Al-Arabi Shamoun: 1999, p. 27)

3- Principles of Measurement and Testing in Elite Sports Training:

The measurement and testing processes are based on several principles, including:

* Consistency of tests with the intended objectives. If the goal is to determine a student's level of achievement, the teacher uses achievement tests of various types: essay, objective, etc. If the goal is to measure intelligence, an intelligence test such as the Bennet test or the Wechsler test is used.

The same applies to tendencies, attitudes, values, and social relationships, each of which uses its own tests.

* Suitability: The scale must be appropriate for the nature of the individuals to whom it is applied.

* Comprehensiveness: The scale must cover all aspects of the subject: cognitive, social, emotional, and physical. Its items must also represent the objectives of the subject, encompassing the main concepts, principles, and skills included in the subject's content, and including items that address the following aspects: knowledge, comprehension, assimilation, analysis, synthesis, etc.

*The evaluation process also requires that it encompass all aspects related to the educational process, such as: the student, the science, the curriculum, the textbook, the educational tools, the school building, school activities, etc.

*We ensure that evaluation does not deviate from the educational situation, but rather occurs within it, as an integral part of it. Test items should be drawn from the material the student has learned.

*All those involved in the educational process, including teachers, supervisors, students, and parents, should participate in the evaluation process. (Zakaria Muhammad al-Tahir et al.: 2002, p. 19)

*Evaluation should ensure that it leaves a positive impact on the student and raises their morale. It should not create distress within them or become a cause for despair due to failure.

*Continuity: This means that evaluation should be an ongoing process to determine whether the educational program is achieving the objectives set for the educational process. Evaluating educational work should not be a final process, but rather the beginning of a new endeavor. *Diversity in assessment methods and tools: Assessment methods and tools must be diverse to enable us to obtain more comprehensive information about the field we are evaluating. When assessing human behavior, it is difficult to rely on a single method. Tests, interviews, observation, and other methods each reveal an important aspect of behavior. Therefore, we cannot limit ourselves to using just one method; rather, we must utilize a reasonable number of them to complete the picture we wish to

evaluate. School tests should include multiple questions, including essay questions and various types of objective questions.

*Distinction: This refers to the test's ability to reveal individual differences between students in terms of achievement or performance, and to determine their practical and academic levels. This is facilitated by the diversity of questions in terms of difficulty or ease.

*Ease of application, correction, and drawing conclusions: This means that tests should not take a long time for students, and that their wording should be specific, so that answers are clear and concise, making them easy to correct objectively. Furthermore, organized criteria for tests should be developed so that students' scores can be translated into specific levels. * Saving time, effort, and money to avoid stressing and exhausting both teachers and students.

* Test validity: This means that the test actually measures what it was designed to measure. A test designed to measure a specific skill must accurately measure that skill and nothing else. For example, an achievement test for arithmetic must measure students' achievement in arithmetic, not their achievement in reading. Undoubtedly, the validity of the entire test depends on the validity of individual items. If its items are not valid item by item, the test cannot be valid.

* Reliability: A stable test yields the same results when repeated on the same sample of students under the same conditions. This means that every student receives the same grades, provided there is no training between test periods. Therefore, attention must be paid to the precise wording of test items to avoid different interpretations by students.

* Objectivity: Objectivity means that the results are independent of the evaluator's subjective judgment (Zakaria Muhammad al-Tahir et al., 2002, p. 21).

4- The Importance of Tests and Measurements for Sports Coaches:

* Identifying the general training status using motor tests, studying the functional capabilities of the body's internal systems, and anthropometric measurements, while determining psychological and physical abilities.

* Identifying the athlete's specific training status using tests that include functional measurements of the body's systems, psychological capabilities, physical, skill, and health abilities.

* Identifying the extent of progress in sports results and monitoring them to achieve high levels.

* Selecting young athletes through tests in various sports. (Laila Al-Sayed Farahat: 2001, p. 41)

* Stages of Developing Sports Tests and Measures.

Sometimes, the sports coach may find that standardized tests are not suitable for use in the local environment, or are not suitable for measuring the outcomes of the teaching and training processes, or do not allow for identifying the strengths and weaknesses of students or players. In such cases, it becomes necessary to develop or construct some tests to be used to achieve the goals sought by the sports coach. (Muhammad Hasan Alawi - Muhammad Nasr al-Din Radwan: 2008, p. 318)

1-Step One: Preparing the Test Outline:

In this step, the test designer determines the areas to be covered by the test items.

2-Step Two: Writing the Test Items:

In this step, the test designer writes the items for each area they have identified in the test outline. Typically, they write a number of items approximately 1.5-3 times the number of items the final version of the test will include. This way, one of the item analysis methods can be used to identify weak items that can be deleted or alternative items can be tested.

3-Step Three: Applying the Initial Test Form:

The test developer applies the vocabulary they have written to a relatively large number of test subjects (no less than 50, and preferably several hundred). The sample of test subjects must be representative of the population for which the test will be used in its final form (Ismail Muhammad al-Faqih: 2005, p. 129).

4-Step Four: Vocabulary Analysis

The test developer conducts a vocabulary analysis. Based on the results of this analysis, they select the best items and revise them if necessary. The third and fourth steps are known as the item tryout.

5-Step Five: Test Standardization

The standardization process involves developing a comprehensive and clear plan for all test steps, procedures, method of application, interpretation of scores, and defining the behavior required of the individual and the conditions surrounding them during the test application, in addition to establishing criteria for interpreting the results. (Ali Samoum al-Fartousi et al.: 2014, p. 178)

After determining the vocabulary to be included in the revised version of the test, the test developer applies this revised version to a representative sample of examinees other than the sample used for the vocabulary test. The test is administered under the same standardization conditions as the final version of the test. If the test is appropriate, this step can be used to obtain norms. This step is known as test standardization. If the test is inappropriate, the test can be returned to step two or step four. (Ismail Muhammad al-Faqih: 2005, p. 130)

Measuring the criteria for validity, reliability, and objectivity. (Ahmad Muhammad Khater Ali Fahmi al-Bayk: 1996, p. 31)

*Standardization sample:

Selecting a relatively small sample whose members are from the original population we are studying and possess the same distinctive characteristics as the original population we are studying. These factors allow us to generalize the results we reach from studying the specific sample to the original population. (Abbas Mahmoud Awad: 2006, p. 69)

On the other hand, Abdel Hadi El Sayed Abdo and Farouk El Sayed Othman summarize some of the steps involved in developing a test as follows:

1. Defining objectives

2. Defining objectives procedurally.

The objective includes three levels:

A. Defining content and skills.

B. Defining traits.

C. Analyzing the task. (Abdel Hadi El Sayed Abdo and Farouk El Sayed Suleiman: 2002, p. 34)

Step Three: Reviewing test items.

Step Four: Analyzing the test.

This step includes several processes.

A. Standardization

The goal of establishing standards for a test is to have a psychological test that is accurate, has a low error rate, and minimizes factors unrelated to the objective. Normativity means that test items have a single meaning and a single response that all examinees understand without any hidden interpretation. Commonly accepted criteria include the Z-score and the T-score.

B- Content

The content of test questions must be direct, clear, and understandable to the examinees. It must be appropriate for the examinee and have a specific time limit. Questions must also exhibit a degree of logic (Popham, 1978). Content may take verbal or performance forms, and culture plays a major role in the content of test items.

C- Administration

The test can be administered to a group of examinees to ensure that the test items, instructions, and everything related to it are clear and understandable. This step is important because it serves as the final review, after which the test can be administered. This step determines the appropriate time for application and the scores for each item or part of the test.

Step Five: Psychometric Analysis

Psychometric analysis of a test means determining and estimating the reliability coefficient, validity, and criteria for the test. (Abdul Hadi Al-Sayyid Abdo Farouk Al-Sayyid Suleiman: 2002, pp. 35-36)

On the other hand, Kamal Al-Din Abdul Rahman Darwish and others state that when constructing or designing tests, the following steps must be followed:

*Defining the problem:

Defining and analyzing the problem is a prerequisite for conducting and constructing the test. It is difficult to reach a solution to the problem unless the researcher possesses the talent to isolate and understand the specific factors that led to the problem (Kamal Al-Din Abdul Rahman Darwish et al.: 2002, p. 25).

*Defining objectives:

Defining objectives is essential for test development and an important step following problem identification. Harrison Clark believes that defining objectives is one of the most important steps that a test designer or developer must carefully consider before beginning to design it, provided that the objective is completely clear in the researcher's mind. (Kamal El-Din Abdel Rahman Darwish et al., 2002, p. 26)

*Content Analysis:

This refers to analyzing the work or performance, meaning conducting a comprehensive and accurate scientific study based on several methods and sources.

*Creating (developing) the test:

After the problem is clear in the researcher's mind, and the objectives are specifically identified, the content or performance analysis highlights the dimensions of the trait, ability, or skill being measured, and the researcher determines the research sample and the specifications that the tests should include, the scientific steps for developing the test must be followed in the following steps:

1- Preparing the Test in its Initial Form:

Here, the test developer writes the test description he arrived at as a result of defining the problem, identifying the objectives, and analyzing the content. After presenting it to experts to determine its suitability for measuring what it was designed for, the test is thus prepared in its initial form. 2- Conducting exploratory studies:

After the test is prepared in its initial form, the researcher applies the test to a sample representative of the exploratory studies, with the aim of verifying its validity or introducing some modifications to its elements. He may delete, add, or modify some elements.

William Micheal explains that exploratory studies have several advantages, including:

- They serve as a prelude to testing hypotheses, then lead us to the most valid tests, and may lead us to change some hypotheses, reject others, and call for the formulation of new hypotheses we need. (Kamal El-Din Abdel Rahman Darwish et al., 2002, p. 10)

- They provide the researcher with ideas and methods for approaching objectives and guide us to alternatives and solutions that may greatly increase the chances of obtaining clear results.

- They allow for reviewing the results, analyzing the procedures, and selecting the most appropriate statistical methods for processing the data. They may also lead us to change the treatments. Therefore, they contribute to determining the statistical methodology that enables the researcher to analyze the results with high efficiency. - It reduces errors. Without pilot studies, it may be difficult to detect obstacles, and problems may arise when implementing important aspects of the test or curriculum.

- It saves the researcher money and time, which may not be invested in anything important if pilot studies are not used. It always provides accurate data for research workers, enabling them to make sound decisions about the test's validity.

- It helps uncover some flaws in the test, which clarifies and helps make adjustments to improve the test, such as changing the distance, time, or tools, etc.

3- Preparing the Test in its Final Form:

After conducting pilot studies, analyzing their results, and making appropriate adjustments, the researcher arrives at a final version of the test. The researcher may conduct another survey to obtain expert opinion on the final version of the test. The results of the pilot studies may be sufficient, and the prepared test is thus standardized. 4- Test Standardization:

Standardization contributes to the proper interpretation of the scores obtained by the examinees. Standardization processes require conducting pilot studies on specific samples, with the goal of determining validity and reliability indicators (Badr Muhammad Al-Ansari: 2000, p. 64).

After developing the test in its final form, the researcher applies it to a sample similar to the research sample for the purpose of:

a. Verifying the test's scientific coefficients (if the researcher uses tests with scientific coefficients) (Kamal Al-Din Abdul Rahman Darwish et al.: 2002, p. 28)

b. Calculating the scientific coefficients (validity and reliability) using appropriate methods. This allows the selection of tests that achieve high scientific coefficients and the exclusion of tests that do not achieve high scientific coefficients. Valid tests are classified into homogeneous groups.

5- Test Application:

After verifying the scientific parameters of the test, valid tests are applied to the study sample to obtain the data required for statistical processing.

Scientific Conditions for a Good Test:

6- Conclusion:

For the success of elite sports training and to achieve distinguished athlete preparation, the scientific conditions and standards for the measurement and testing processes used in elite sports training must be adhered to.

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