Technical-Physical Evaluating of High Jump Athletes

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Abstract

Technical-Physical evaluation is the estimation of technical skills level of an athlete according to his physical ability. Clearly, vertical jump testing has numerous sport applications; but there are many different protocols being used to assess vertical jump ability and explosive power in athletes.This study presents an equation for evaluating the high jump athlete. The equation is to evaluate the actual performance of any athlete by a degree of ten using the simple and most efective factors. The paticipants were two groups (distinguished and non-distinguished). The authors used T test and Correlation coeffecient to prove the validity , realiability and the stability of the equation in order to evaluate the technical-physical skills. The results indicted that the equation is valid not only to evaluate the technical-physical skills, but also to predict the best personal record according to his physical ability. This method can motivate the athletes and the coaches to improve the physical abiltity and the personal record.

Key: Technical evaluation, physical evaluation, high jump,athletics.

Introduction

Technical-Physical evaluation is the estimation of technical skills level of an athlete according to his physical ability (Khafagy, 2017).The Technique affects strongly the personal record. Therefore, the continous evaluation is important to clear the weakness aswell as the strength, where the evaluation is the process that give a meaning to measurement results by relating it to norms and standerds(Baumgartner , 2016).

Evaluation is divided into two categoties according to the method (self-evaluation and objective-evaluation), while it is devided into four catigories according to the time of process (initial, formative, summative, and follow up evaluation)(Farahat, 2001; Khater & Ali, 1996; Zahran, 1991).

Main goals of evaluation are to learn about a phenomena , measure it by test and to understand it by refering the raw data to a reference system to drive a meaning (Allam, 2000; Morrow , Mood, Dale,, Disch, James G.,, Kang, Minsoo, 2016; Radwan, 2011).

Standards represent the performance values of a particular community in a particular test, and this particular community of people is called the rationing group, and they are the normative values parallel to the raw values extracted from the tests. The presence of criteria allows the participant to know his relative position in the group, and this is an important and necessary measure to

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achieve the conditions for evaluating the ideal(Hasaneen, 2001; Smith Biddle, Stuart J. H., 2008).

Therefore, attention was paid to evaluation processes because of their effective role in clarifying the extent to which the goals and objectives of the education and training processes are achieved, more over knowing the level of performance and the ability to develop it. Tests and measures based on scientific foundations are among the tools that help coaches and teachers in evaluating performance in various sports activities(Badran, 2015).

Tests and measurements are one of the scientific methods by which talented athletes can be detected, and the best elements distinguished by a high level of physical abilities for the high jump can be detected. Barrow and McGee confirm that the use of scales and tests in physical education contributes greatly to setting standard grades and dividing individuals into levels. It is also a guide for motivation among athletes (Barrow, 1979)

Clearly, vertical jump testing has numerous sport applications; but there are many different protocols being used to assess vertical jump ability and explosive power in athletes. Fortunately, many vertical jump field tests are very practical in terms of time, effort, and equipment(Klavora, 2000).

Vertical jump tests provide an effective measurement of power as an indirect measure of performance. Coaches and professionals have long used performance tests such as the vertical jump to assess athletic ability, which helps them to identify athletes' strengths and weaknesses(Klavora, 2000). Since most athletes and coaches strive for an improvement in performance, vertical jump testing is being used to measure the effectiveness of various training programs in developing explosive power (Jiménez-Reyes et al., 2017).

Jump events are section of field events , which are long jump, triple jump, high jump, and pole vault(Ahmed, 1997). The goal of performance varies for each of the jumping events. The goal of the high jump is fly over the cross bar to achieve the highest vertical height. The high jump technique consists of approach, take-off, flying to cross the bar and then landing, which are done by the Fosbury-Flop stylewhich was approved by 1968, with which the best three world records were achieved(Gifford, 2012; Guthrie, 2003; Tawfeek, 2004)

Good high jump technique requires a fast curved-approach to help produce additional power to the player's body.Arms and free leg movements help to overcome the force of gravity and to achieve the greatest vertical distance by pushing the player's foot during take-off. Many coaches are interested in applying the biomechanics'laws of motor performance in a way that ensures the proper utilization of human capabilities and achieving the highest levels of achievement(Badran, 2015).

Fosbury-Flop high jump depends on anthropometric factors, which are linked to body height, musculartplyometric qualities to jump high and ability to clear the bar. This theoretical approach incorages

researchers to compare different jumping tests and to predict the Athlete's personal record

Unlike predictive studies(Atwa, 2002; Laffaye, 2011), which focus on involving the most relative variables to Fosura-Flop in an equation in order to find the maximum hight or record of an athlete, this study evaluate the actual performance of any athlete by a degree of ten according to the simple and most efective factors. In addition, in arabic studies, the personal record is main critera to evaluate the athlete's performance before and after appling training or teaching programs. Experties evaluating form is another method to give the participant a degree for his erformance. This study presents an equation for evaluating the high jump athlete. This equation considers the anthropometeric treats and a curved-approach vertical jump test (Laffaye, 2011). Evenmore, the suggested equation can guid the athlete to his weakness by presenting the difference between the current personal record and the predicted record of the athlete.

Questions:

1. Is the suggested equation valid to evaluate Technical-Physical high jump performance?
2. Dose the equation valid to present the effect of the Technical Skillon the high jump personal record?

Related studies

Nizar Al-Wais and others (2019) conducted a study entitled "Building normative levels to evaluate the studentsperformance in jump events in Physical Education Faculty at Yarmouk University ". The particiepants are (1798) students of Physical Education at Yarmouk University''. They were distributed between (899) male and female students in the athletics education course and (899) male and female students in the athletics training theories course for the semesters (first - second - summer). In order to measure the personal achievement of students in the long, triple and high jump, the approved performance tests by teachers in the Faculty of Physical Education, were conducted. The results indicated that the achievement level of participants in the long and triple jump activities was within the normal, but it was low in the high jump in athletics. (Al–luwaici et al., 2019).

Mona Suleiman (2006) conducted a study entitled "Assessment of the technical performance of the high jump by the saddle method using the Hay and Rabid model for qualitative analysis". She used the descriptive and experimental approach on a sample of 20 students. They were chosen by a deliberate, random method. The results proved the validity of the designed form and considered it a good scientific method for evaluating the technical performance of the high jump "saddle method" through the expected errors in performance. The form included (13) errors, which were distriputed as (4) errors in the approach phase, (5) errors in the tack-off phase, (3) errors in the flight phase, and (1) an error in the landing phase.The phrases (performance errors) in this form are qualitative and quantitative descriptions for evaluating

performance through the process of visual imaging and re-presenting it, and converting the qualitative description into degrees through which performance can be judged by degrees, which is a method closer to objectivity. The results indicated that the scientific coefficients of the designed questionnaire were high in terms of validity and reliability, as the content validity ranged between (56%, 92%), for the statements of the questionnaire, and the validity of excellence enjoyed a high degree of judgment. The questionnaire's stability reached (0.843). Qualitative analysis using the "High-Wide" method, which depends on the inventory and clarification of the technical performance of the skill and its fragmentation and giving each part a degree in proportion to the importance of this part, which helps in a greater understanding of each part, as well as identifying the common, recurring and expected performance errors in each part of the skill and related to the performance Particular body parts and evaluation of the student on this basis are methods closest to objectivity(Soliman, 2006).

Method

Participants

They were classiffied into two groups, (8) elite high jump athletes under (18 years) from Al-Ahly Club (as a distinguished group), (16) students in athletics specification at physical education faculty, University of Sadat City (as non-distinguished group).

Table (1)
Participants discription, Mean and Skweness

groups	variables	unit	Mean	SD	skewness
distinguished	age	year	17.5	0.535	0
	weight	Kg	73.75	6.41	0.475
	hight	m	1.87	0.11	0.541
Non-Distinguished	age	year	19.13	0.34	2.51
	weight	Kg	76.25	2.81	0.481
	hight	m	1.81	0.02	0.63

Table (1) proved the symmetry of data distribution, where the values of the variables are in between (± 3).

Procedures

The students (non distinguished group) test and high jump trials took place after after a lecture, where they were already warmed-up. First the curved-approch vertical jump test, where the students could choose their run-up, but a curve like that observed in the fosbury flop technique was drawn on the floor to induce lateral incline in the last 4 steps. They were let to have3 trials to touch the highest point they could on the wall with the opposite hand from their take-off foot. The student mark on the wall with a chalk. Only the best trial was kept for further analysis. Second, high jump trials, where each student has trials acording to the official rules of the

International Association of Athletics Federation (IAAF)(World Athletics). For calculating the center of gravity, the students'heights were mesured.

Statistical analysis

The analyses were conducted using SPSS package. The evaluating equation was applied to the collected data from the two groups. First, the mean of the personal records of high jump of the two groups was calculated. Then, calculating the mean of the predicted records of the two groups using the resultes of the curved-approach vertical jump test. Finally, test the Interrater reliability by calculaing T-Test between the distinguished group results and non distinguised group resutls. To prove the stability of the (Equation or Test), the correlation coeffecient between the test and retest has been calculated.For proving the Objectivity, the results of the tests were calculated by two arbitrators, then the results were compared by T-test.

The Equation

The personal reord (PR) of high jump depends on athlete's physical ability (PA) and his technical skills (TS). If the athlete optimized his performace (physically and technically), it would be reflexed in his personal record. If we assumed that the optimum performance equals one degree, then;

Physical abilities × technical skills ≤ the physical abilities

Through evaluating the TS, the best PR could be predicted relaying on athlete's physial abilities. The main variables that affect the high jump technique are the Athlete's height (AH), the height of center of gravity (COG), the curved-approach vertical jump test result (CAVJ). The next equation is formed by Mostafa Atwa(2002), which illustrates the relation among the variables(Atwa, 2002; Laffaye, 2011, 2012).

Predicted personal record (PPR)= CAVJ– 0.03+(AH × 0.65)

Where (0.65 m) is the persentage to calculate the height of center of Gravity add to 9cm the additional high of toe-stand measurement (Grimshaw et al., 2019), and (0.03m) is the safe distance above the Crossbars not to move it.

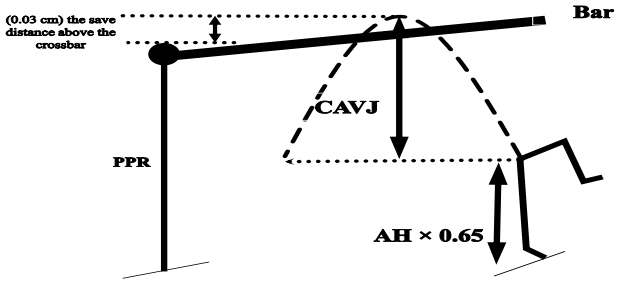

Figure 1 Predicted Personal Record equation diagram

$$Technical\ skill\ (TS) = \frac{Technical - Physial\ ability(T-PA)}{physical\ Ability\ (PA)}$$

Then if we evaluate the performance giving a degree of 10 then the equation would be:

$$Technical\ skill\ (TS) = \frac{Personal\ Record\ (PR)}{CAVJ - 0.03 + (AH \times 0.65)} \times 10$$

An examle: if the athlet's height is 2m, his personal record is (1.85m), and he achieved (0.8m) in the curved-approach test, then:

$$Technical\ skill\ (TS) = \frac{1.85}{0.8 - 0.03 + (2 \times 0.65)} \times 10$$

= 8.94grade

Then, we can evaluate the technical skill by 8.94 of 10 grade. Therefore, if the atlete want to reach 10 grades, he supposes to cross the bar at height(2.07m) in high jump. As a result, we know the target height of the athlete according to his body height (AH) and his physical ability (PA) in curved-approach vertical jump test (CAVJ). If the athlete improved his power and achieved higher degree in CAVJ ,his targeted PR would increase consequently.

Results

Interrater reliability

There is a signifiance of T-Value between the two groups in the technichal-physical test (table 2), which indicates to the interrate reliability of the equation, where the calculated T-value is (14.174) greater that the tabular value (2.07) at 0.05 and (2.81) at 0.01.

Table (2)

T-test values between results of the two Groups (n=24)

variable	distinguished		Non-Distinguished		T-Value*	Propability
	Mean	SD	Mean	SD		
The technichal-physical test	9.778	0.585	6.608	0.481	14.174**	0.01

*T-Value at 0.05= 2.07 and at ** 0.01 =2.81

Stability

Table (3) prove the stability of the test results between test and retest method, where the correlation coefficient value is (0.99).

Table(3)

Correlation Coeffecient between Test And Retest results of the two Groups (n=24)

Varible	Test		Retest		R Value*
	Mean	SD	Mean	SD	
The technichal-physical test	7.667	1.594	7.721	1.545	0.999

*R Value at 0.05 =0.404

The stability of a test or Equation output indicates to the accuracy of the evaluation method of a phenomenon, This is proved when the results of the test and the Retest are close or identical on the same group of people(Coulson & Archer, 2015; Radwan, 2011).

Objectivity

This method is designed to exclude as far as possible the subjective element on the part of both those taking and grading it(Radwan, 2011).Table 4 prove that there is no signeficant differences between the grades that evaluated ba two arbitrators, who had followd the procedures of the study to evaluate the Technical-Physical test of High Jump and applied the equation. Where the calculated T-value is (0) and the tabular value at 0.05 is2.07 and at 0.01 is 2.81

Table (4)
The T-Value between the dgrees of the two arbitraros using the equation (n=24)

Variable	First Arbitrator		Second Arbitrator		T-Value*	Probability
	Mean	SD	Mean	SD		
The technichal-physical test	7.664	1.608	7.664	1.608	0	0.05

*T-Value at 0.05= 2.07 and at ** 0.01=2.81

Discussion

The suggested Technical Skill equation is valid, reliable, and stable to evaluate technical skills of high jump performance by involving the most effective variables on High Jump. The evaluation method is easy to be applied by measuring the athlete's hight (AH), the curved Approch High Jump (CAVJ)test result, and his Personal Record(PR). The result gives information to the coaches or the teachers about the high jumper's ability and enables them to know the athlete technical skill level. This enables athletes and coaches to clearly see the target and plan to achieve it with a continious assessment process. The exact purpose ofperformance evaluation(Abd El-Hameed & Hasaneen, 1997; Morrow , Mood, Dale,, Disch, James G.,, Kang, Minsoo, 2016).

The difference between the Predicted Personal Record (PPR) and the current Personal Record (PR) is the target centimeters to optimize your Technical Skills (TS), which indicated the gape between the physical ability (PA) and the Technique skill. That is the effect of technique on the Personal Record (PR). On the one hand, this method allows one to motivate the athlete, who knows the best performance he or she could achieve after learning the best techniqueand inhancing his physical ability.

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