Effect of exercises according to strength-time aspects to develop some of performance stages and triple jump achievement for beginners

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Abstract:
Present study aimed to know the effect of exercises according to strength-time aspects on development some of performance stages and triple jump achievement for beginners. 20 students were participated in current study and divided in two groups each group included 10 students. Experimental research design method was used because it is suitable to the nature of the study. However, researcher used some of tests such as (foot scan and force platform) which are new scientific devices. Results of current study showed a significant difference between pre and post-tests in triple jump such as (hop, step, and jump). Study concluded that using exercises according to strength-time information resulted in development of triple jump stages, performance, and retention.

Key words: exercise, strength-time aspects, performance stages, triple jump, and beginners.

1. Introduction:
The use of technical devices on learning the most athletic movements and various events including the activity of track and field has become a necessary because these events involve many of skills which characterized the difficulty of performance due to the multiplicity of stages of technical and interdependence of the mechanical side in which workers and trainers have to use in this area all teaching instruments possible in order to reach the ideal performance.

Researcher sees that the use of technical devices to observe and get the information regarding the performance is very important and essential on the integration and mastery of teaching especially in the stages of learning whether the performance of activity is simple or complex. No study has investigated the effect of specific exercises through using the technical devices and also using a movement analysis to learn one of track and field events which is triple jump during correct repeat of the technical stages (training) and feedback that has been got from the analysis and force platform results in order to reach the high performance streamline of this activity and consistent with the economic performance and the smooth streamline of this performance with a high degree at which comes on top of issues which aims to enhance the performance and integration of learners and the statement of the importance of using two (foot scan and force platform) in the learning event. In addition, the use of technical devices results in
identify weaknesses and imbalances when performing steps of triple jump and measure the force exerted and pressure areas which place by player in the forefoot or heel or correct push status and find the ratio between the strength push and body weight. We can also adjustment the body position between the power-driven and body weight, longer these devices are measurement to pressure areas, force and time and defect places and are placed on the basis of learning exercises to get rid of the problems and defect. However, present study aimed to know the effect of exercises according to strength-time aspects on development some of performance stages and triple jump achievement for beginners.

2. Methodology:
2.1 Subject:
20 students were participated in current study and divided in two groups each group included 10 students. Experimental research design method was used because it is suitable to the nature of the study.

2.2 Tests:
2.2.1 Foot scan test:
Foot scan device is one of the new scientific apparatuses within sport biomechanical labs around the world. It consists of jump platform and its dimensions (50cm x 50cm), digital wire extends from the platform from one side and from the other side is ended of (USP) which is linked to a laptop with a special program provider (software) in which we start up the platform and extract digital, image and video data.

The device gives a range of variables such as inflicted power on the platform (Newton) for each part of the ten foot parts (depending on the program division of the foot) and also gives the overall inflicted strength of the foot on the platform. The device measures the amount of pressure off each part of the ten foot parts (depending on the program division of the foot) Newton per square centimeter (Net / cm). In addition, gives the duration of time from the beginning of the first touch of the foot of the platform to the moment of departure of the last part of the foot of the platform. The device also gives a picture of the longitudinal and transverse axes of the foot and dimensions (in centimeters) figure (1) showed scan foot device.

![Figure (1) shows scan foot device](image)
2.2.2 Platform of the force measurement device test:
The platform was used by a number of studies which measured jump events through estimation of technical performance (Meivin & Ramey 1983). The platform has the ability to measure the force, whether horizontal or vertical or both as well as their outcome and responds to the amount of change in the accelerating movement of the body's center basing on his work on Newton's second law:-

\[
\text{Strength} = \text{Mass} \times \text{Acceleration}
\]

The platform is linked to computer by a wire (USP) to record the time and amount of strength as well as force – time curve patterns (force – time curve) for three endeavors of the steps of triple jump. We can enlarge the image foot on the platform, such as foot which described above and see areas of the distribution of force on the platform where the platform is measure the force in every square centimeters and amount of inflicted force and with a maximum rate of 80 newton, so we will see the colored areas in red are the most pressure as shown in figure (2).

Figure (2) shows the tester stand up on the foot scan with both feet

Figure (3) shows enelarge image of the foot
2.2.3 **Triple jump test:**  
- Name of test: Triple jump and video graphical.  
- Purpose of the test: Measurement of technical performance.  
- Descriptive of the test: Tester runs the approach phase for distance (20-25m) because he is a beginner, he starts with the basic movements by having your athletes Hop, Step and then Jump from a standing start. The take-off foot should be the athlete's strongest leg, as it will be used in the Hop and the Jump phases.  
- Instructions:  
  1. Tester does not exceed the jump platform.  
  2. Landing on the both feet.  
  3. Distance is measured from entire of the jump platform to the nearest trace of jump platform on the ground.  
  4. Three endeavors for each student.  
  5. Prepare a form to estimate technical performance (Sareh., 2011).

2.3 Estimation form:  
Researcher prepared estimation form to evaluate technical performance of the triple jump, activity is divided in three sections (hop, step, and jump) and researcher is given one degree for each section as view of experts and specialists.

2.4 Pre-tests:  
The researcher distributed work team and places of the cameras and pre-test was conducted on Monday 12/11/2012 at the morning, after a warm-up process has been given for each student three attempts and adopt a successful attempt.

2.5 Main experiment:  
Main experiment was conducted on November 19, 2012 to December 27, 2012 which included 12 teaching units, 2 units each week. Researcher prepared specific exercises according to strength-time curves for the foot scan, exercises included development of physical aspects related to steps of triple jump as well as learning technical performance for learners by using some of devices and tools which help to improve performance level of the study subject.
2.6 Post-tests:
Post-test was conducted on Monday, December 31, 2012 and researcher was followed the same procedure of pre-test.

2.7 Retention test:
Retention test was run after 14 days of post-test on Monday, January 14, 2013 to make sure that subject can be retention of their performance. However, researcher has been followed the same conditions and procedure of post-test. To measure retention level we will use following equation (Mohammed & Alaa, 2003).

\[
\text{Percentage of retention} = \frac{\text{Amount of lost}}{\text{Amount of development}} \times 100
\]

2.8 Statistical analysis:
Data were analysis by using SPSS and our study included following statistical (Mean, median, standard deviation, independent T test, and dependent T test).

3. Results and discussion:
Table (1) showed a significant difference at all force measurement aspects such as (hop, step, and jump) between pre and post-tests for experimental group and in favor of post-test, whereas control group showed no significant differences.

Table (1) shows means differences, deviation error differences, T-test, and significant differences between results of pre and post-tests for force variations.

<table>
<thead>
<tr>
<th>Variations</th>
<th>Measure unite</th>
<th>Group</th>
<th>Means different</th>
<th>D error differences</th>
<th>T test</th>
<th>Error level</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hop strength</td>
<td>Newton</td>
<td>Experimental</td>
<td>517,4</td>
<td>77,80</td>
<td>6,650</td>
<td>0,000</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control</td>
<td>82,44</td>
<td>36,7</td>
<td>2,346</td>
<td>0,055</td>
<td>No</td>
</tr>
<tr>
<td>Step strength</td>
<td>Newton</td>
<td>Experimental</td>
<td>666,2</td>
<td>58,17</td>
<td>11,451</td>
<td>0,000</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control</td>
<td>61,88</td>
<td>28,83</td>
<td>2,146</td>
<td>0,064</td>
<td>No</td>
</tr>
<tr>
<td>Jump strength</td>
<td>Newton</td>
<td>Experimental</td>
<td>516,4</td>
<td>51,81</td>
<td>9,966</td>
<td>0,000</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control</td>
<td>65,11</td>
<td>20,4</td>
<td>3,191</td>
<td>0,013</td>
<td>S</td>
</tr>
</tbody>
</table>

Results of explosive power test which demonstrated in table (1) showed a significant difference between pre and post-test and favor of post-test for experimental group, researcher attributes these results into learning exercises that prepared scientifically and mastery by researcher and stay away from random through a formation of used teaching instruments, methods and styles and change the shape and types according to the goal of learning and to resolve the main task which helps to reach to the good level of performance for learners as well as variable of force that measured in the test is an expression of explosive power because it is one of the key components of muscle strength, the index of the explosive power has a relationship between strength and speed, in fact reflects the situation of tensile and relaxation between muscle groups in the shortest time possible for once is the most important kinetic capabilities for the triple jumper. Qassim (1998) showed that strength is increased whenever...
decline the time of muscle contract and reverse is correct; it means if the muscle contraction being longer whenever the amount of force is changed, also if the strength is increased results in increasing the velocity.

Table (2) showed a significant difference for all technical performance of steps triple jump such as (hop, steps, and jump) between results of pre and post-tests for both groups and in favor of experimental group but no significant differences for control group. The development has been because of specific exercises which resulted in learning this stage and next stages according to closed motor control that confirmed the effective effect of the development of technical performance level for experimental group in comparison control group.

Table (2) showed means differences, deviation error differences, T-test, and significant differences between results of pre and post-tests of technical performance variations.

<table>
<thead>
<tr>
<th>Variations</th>
<th>Measure unite</th>
<th>Group</th>
<th>Means different</th>
<th>D error differences</th>
<th>T test</th>
<th>Error level</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance of approach</td>
<td>Degree</td>
<td>Experimental</td>
<td>3,30</td>
<td>0,223</td>
<td>6,31</td>
<td>0,000</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control</td>
<td>0,20</td>
<td>0,23</td>
<td>0,895</td>
<td>0,560</td>
<td>No</td>
</tr>
<tr>
<td>Performance of hop</td>
<td>Degree</td>
<td>Experimental</td>
<td>4,400</td>
<td>0,305</td>
<td>4,402</td>
<td>0,001</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control</td>
<td>0,400</td>
<td>0,221</td>
<td>1,809</td>
<td>0,104</td>
<td>No</td>
</tr>
<tr>
<td>Performance of step</td>
<td>Degree</td>
<td>Experimental</td>
<td>4,700</td>
<td>0,395</td>
<td>1,874</td>
<td>0,001</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control</td>
<td>0,200</td>
<td>0,290</td>
<td>0,688</td>
<td>0,509</td>
<td>No</td>
</tr>
<tr>
<td>Performance of jump</td>
<td>Degree</td>
<td>Experimental</td>
<td>4,00</td>
<td>0,258</td>
<td>5,492</td>
<td>0,000</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control</td>
<td>0,100</td>
<td>0,267</td>
<td>3,361</td>
<td>0,726</td>
<td>No</td>
</tr>
</tbody>
</table>

Table (2) showed also a significant difference between two groups and in favor of experimental group in three steps of triple jump (hop, step, and jump). Researcher sees that the reason of development return to learning experiences which students were got from learning exercises through gives the learners clear picture for performance of motor skill and provide them an information by using foot scan of force-time which led to help learners to acquisition perfect performance, as well as prepare suitable teaching environment, active method, and correct repeat inside of teaching unite. Wajih (2001) found that one of the exercise results is the occurrence of relatively staple performance ability or to learn, this effect produces to staple changeable in behavior of students, in fact, the staple change on operations which are allowed for individuals to perform a work at the future.

Table (3) shows differences between retention tests of Two groups

<table>
<thead>
<tr>
<th>Variations</th>
<th>Experimental group</th>
<th>Control group</th>
<th>T test</th>
<th>Error rate</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>16,76</td>
</tr>
<tr>
<td>Performance of hop</td>
<td>6,700</td>
<td>0,674</td>
<td>2,300</td>
<td>0,483</td>
<td></td>
</tr>
<tr>
<td>Performance of step</td>
<td>6,100</td>
<td>0,737</td>
<td>1,800</td>
<td>0,632</td>
<td>13,99</td>
</tr>
</tbody>
</table>
Table (3) showed a significant difference in retention and forgetting degrees between experimental and control groups at all tests where we note that experimental group that used exercises according to information of force and time has been got the higher degree in retention test of triple jump comparison in control group. Triple jump performance related directly to learning and training through learning unites, so the exercise or training during teaching unites are found to improve motor learning and the use of motor program which is basically depended on type of learning unite and the task of teaching, it means the exercise is placed for helping of improve motor learning. However, provide the information about force and time during skill performance resulted in mastery it as well as led to add correct knowledge and fact expert to build perceptions and increase understands and make the instruction distinguished (Naif., 2003).

4. Conclusion:
Study concluded that using exercises according to strength-time information resulted in development of triple jump stages, performance, and retention and improve steps of triple jump (hop, steps, and jump).

References: