The Stations Method Differentiated Levels' Impact on some Special Physical Components Development and Technical level of Javelin Throwing Competition

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Introduction and Problem Study:

Physical Education works to reach its goal by achieving cognitive, kinetic and emotional goals using modern technology and this needs a successful teacher in his subject, familiar with teaching methods, know how to build and design educational situations that is consistent with needs and characteristics of students. Teaching process plays an important role in the educational system. Therefore, many innovative teaching methods have appeared,
as teachers realized that it is difficult to use one method due to the presence of many influencing variables, such the educational situation's nature, quality of the practiced activity, the available capabilities and the individual differences among the students. (٢:٢٣)

Othman Mustafa (٢٠٠٢) points to the possibility of learning through stations method differentiated levels for the same motor skill to be learned, where learning experience can be unique by placing students in stations that take into account their components level while learning. (٥:٣١٥)

Schilling (٢٠٠٠) points to scientific thought's application and technological methods in design and implementation of educational curriculum commensurate with the capabilities, characteristics of students and make teaching process more effective and positive. (١٢:٢٥)

And The Javelin Throwing is one of the difficult competitions that depends on physical components, where is characterized by rapid performance. The total movements performed are synchronized and integrated during the approaching stages, especially the last step (final throwing stage). These stages require accuracy in the exercises which serves the skillful performance. Sports Scientists have agreed that special physical components are one of the most important factors in which the success of performance is based on to reach the highest level. (٦:٨١)

And through the work of the two researchers as a Lecturer Dr. at Faculty of Physical Education for Girls - Helwan University and their experience in teaching process, they found that the traditional teaching methods are not enough to master the basic skills in Field and Track Competitions, especially Javelin Throwing Competition. They noticed that the teacher explains, followed by a model presentation without any actual participation from students in the educational situation and this is not fit with the educational field's development and it is possible to use methods that may be more effective than order method, in addition to the numerical increase of students during the lectures and what follows necessarily increases the individual differences variance between students which increases load on the teacher and also the weakness of physical components among students.

Hence the idea of the research came, where stations method differentiated levels are used to teach the javelin throwing competition to emphasize the importance of using innovative educational methods to achieve the educational process goals and take into account the capabilities of students. So the researchers used this method to improve the technical level of that competition, in addition to develop and improve the level of special physical components.

Stations Method Differentiated Levels is "the way which the students were divided into stations to develop their physical components by doing different exercises under the supervision of their teacher".

Research Objectives:

This research aims to know the effect of using stations method differentiated levels on developing some physical components and improving the technical level of the javelin throwing competition.

Research Hypotheses:

There are statistically significant differences between the three measurements (pre- trace - post) in the physical variables measurement under study for both groups (experimental and control) and there are statistically significant differences between the pre and post measurements in the technical level for both groups.

Previous Studies:

١. Study **"Raed Faeq and Gevat Cecilia" (٢٠١٧)** (١١) entitled **"the use of stations style of differentiated levels and influence in some of the physical capabilities and collectable of kinetic of the effectiveness of the long jump".** The research aims to identify the impact of stations style of differentiated levels in the development of some of physical capacities special and collectable kinetic on the long jump. The researcher used the experimental method, the sample was secondary students in the Department of Physical Education, School of Physical Education in Sulaimaniyah University for the academic year ٢٠١٥/ ٢٠١٦ and totaling ٨٠ students. The sample were (٢٠) students randomly selected to form two groups. Physical fitness tests are the tool for data collection that was applied. The most important results were Stations style differentiated levels has a positive effect on some of the physical components and special collection kinetic of the effectiveness on the long jump.

٢. Study **"Duc Hoa Pho and others" (٢٠٢١)** (٨) entitled **"the use of learning station method according to competency development for elementary students in Vietnam".** This research aimed to identify the impact of learning station method according to competency development of elementary students in Vietnam. The researcher used the experimental method, the study was applied on (١٧٣٥) samples, in which there are (٤١٥) administrators, (٦٧٠) teachers and (٦٥٠) elementary students. Surveys, statistical data and face to face interview are the tools for data collection that was applied. The most important results were teaching using learning station method practice initially proved feasible and made contributions to boosting the quality of Vietnamese teaching.

٣. Study **"Nehbehred Muhammad Talib and Hona Mohamed Rahim" (٢٠٢١)** (١٠) entitled **"the effect of a training curriculum in the style of stations on developing some physical variables and the achievement of javelin throwing among third-year students in the Faculty of Physical Education and Sports Science".** This research aimed to prepare the training curriculum in the manner of stations on developing some physical variables and the completion of javelin throwing and to identify the effect of the training curriculum used in the station style on developing some

physical variables and accomplishing javelin throwing among third-year students in the Faculty of Physical Education and Sports Sciences, University of Halabja. The researchers used the experimental method, the study was applied on (٢٠) student, in which there are (١٠) student in each group, the control group and the experimental one. Surveys, statistical data and face to face interview are the tools for data collection that was applied, in addition to the program used. The most important results were that teaching using stations method has a positive effect on the post measurements taken to the physical variables and on the javelin throwing performance for the experimental group.

Research Methodology: The two researchers used the experimental method for two groups, with the pre, trace and post measurements for each group.

Research Community: The Research Community is represented in students of the second grade at Faculty of Physical Education for Girls - Helwan University for the academic year (٢٠٢٠-٢٠٢١). Their number is (٤٧٨) student, they were chosen in an intentional way from the same grade, their number is (٣٤) students.

Research Sample: The sample was divided randomly into two equal groups, each group consisted of (١٧) student and (٢٠) student were selected as exploratory study, randomly selection.

The Exploratory Study:

It was applied to a random sample consists of (٢٠) students from the research community and outside the original sample for the academic year ٢٠٢٠/٢٠٢١, that was done on Sunday and Monday ٢١-٢٢/٣/٢٠٢١. The tests were re-applied for the second time to ensure this stability, it was on Sunday and Monday ٢٨-٢٩/٢٠٢١.

Objectives of the Exploratory Study:

• Ensuring clarity and appropriateness of the exercises in the proposed program and excluding the unsuitable for students.

• Identify problems and difficulties that may appear during program applying and try to avoid.

• Conduct the Scientific Procedures required (honesty - reliability).

Data Collection Tools:

١- Survey study for specialized scientific references.

٢- Data collection forms for students: including (height, weight and age). IQ test was applied, to calculate the sample's homogeneity and equivalence, it consists of (٩) different tests with a total of (١١٦) degree. Its duration is (١٨) minutes, according to implementing instructions.

٣- Tools and Devices:

- A medical scale, rastmeter, stopwatch and a tape measure.

- Tools for applying physical fitness tests, such as: Medical balls, Swedish chairs and Collars.

- Registration forms to fill in.

٤- Expert Opinion Questionnaire:

- The opinion of (١١) experts from professors specialized in one of the two fields: Curriculum and Teaching Physical Education Methods or Field and Track Training Competitions was taken on ٢٠-٢٧/٣/٢٠٢١. (Attachment ١)
- Their views were taken to choose the best five tests for fitness components must be included in the program. (Attachment ٢)

٥- Tests used: (٥) tests were applied for the most important (٥) physical fitness components of the javelin throwing competition. (Attachment ٤)

٦- The technical level of the javeline throwing competition for the students was evaluated through an evaluation form, which prepared in advance. This arbitration was done by a tripartite committee consisting of three Dr. Professors from training field and track competitions department from our faculty. They registered in that form with (١٠) marks and the middle degree was taken among them. (Attachment ٥)

The Pre- Measurement:

The Pre- measurements were carried out to the experimental and control groups of the physical variables under research and the technical level of the javelin throwing competition according to the evaluation form of the competition by the three specialized professors on Saturday and Sunday ٣-٤/٤/٢٠٢١.

Basic Experiment Application (The Educational Program):

The two researchers applied the proposed educational program on the experimental group at the Faculty from Saturday ١٠/٤/٢٠٢١ to Tuesday ٨/٦/٢٠٢١ for (٦٠) days, (٨) weeks with (٣) units per week in total (٢٤) unit.

These exercises have been applied in form of an educational unit, where the parts of the lesson are:

- The introductory part: warming up, preparing the body to work out includes exercises for all body parts and exercises for joint flexibility.
- The main part: exercises to develop the components of physical fitness through stations method differentiated levels. (Attachment ٦)
- The concluding part: general exercises to calm down the body and return it to its natural state.

In the first month the students were divided into two levels: C and B, based on their pre- measurements in the physical variables of the program, and after one month from applying the program, the trace measurements of those variables were made again. Accordingly, many students moved to the higher level from their previous one, so in the second month they were divided into two levels: B and A, which means that their performance improved in the physical fitness tests.

Trace Measurement:

Trace measurements for the experimental and control groups to the physical variables under study were applied for the second time after four weeks of starting the proposed program application using stations method differentiated levels on Saturday and Sunday ٨-٩/٥/٢٠٢١.

Post Measurement:

After eight weeks, which is the duration of the proposed program. The post measurements were taken for both groups to the physical variables under research (in the same order as before) and the technical level according to the evaluation form with the same committee formed by the three specialized professors on Saturday and Sunday١٢-١٣/٦/٢٠٢١.

The Researchers Role was: determining the exercises for each station, set up the guide card to every station, give the start time signal to the students to start their performance, notice and observe the students while their performance, also distribute the guide card and the score sheet on every student to make sure they all received before their performance.

The Student Role was: apply the exercises as shown in the guide card that was dependent on each station, count to herself how many time she applies the station's exercise and record in the score sheet and when she finished that station, she had to go to another one with different performance. (as shown in the attachment)

Statistical Treatment:

١. Descriptive statistics.

٢. Pearson Correlation Coefficient.

٣. Indication of Differences (T-Test).

٤. Percentages of improvement (%).

٥. One-way analysis of variance.

٦. The Significance of the Differences L.S.D.

٧. SPSS Program (Version ٢١)

Table (١)

Arithmetic Mean, Standard Deviation and Coefficient of the descriptive variables under study (n = ٣٤)

Variables	Arithmetic Mean	Standard Deviation	Coefficient
Age	١٨.٨٥	٠.٧٤٣	٠.٢٤٨
Height	١٦١.٣٢	٣.٩١	١.٠١
Weight	٥٩.٧٦	٥.٣٢	٠.٠٠٥
IQ test	٧١.٨٦	١.٨٣	٠.٨١٤

It is clear from Table (١) that:

The coefficient was limited to (±٣) for the descriptive variables under study, which indicates the moderation of the data.

Table (٢)
Improvement Percentages for the Experimental Group in the Physical Variables (n =١٧)

Variables	The Physical Fitness Test Selected	The Measurement Unit	Pre		Track		Post		Improvement Percentages (Pre/Post)
			Mean	St. D	Mean	St. D	Mean	St. D	
Coordination	Numbered circles	Seconds	٨.٩٦	١.٣٧	٥.٥٣	١.١٢	٤.٨١	٠.٩١٤	٤٦.٣٪
Flexibility	The torso flexion back test from standing	Cm	٥٦.٢٩	٥.٢١	٥٧.٧٠	٦.٣٤	٦٢.٥٣	١١.٢٤	١١.١٪
Arm Strength	Throw a medicine ball with arms over the head from a standing position (weight ٣ kg)	M/Cm	٤.٩٨	١.١١	٥.٨١	٠.٩٤٧	٦.٣٦	٠.٧٩٧	٢٧.٧٪
Leg Muscular Power	Jumping from standing	M/Cm	١.٤٧	٠.١٥٤	١.٦٤	٠.١٦٩	٢.٠٣	٠.٣٢٢	٣٨.١٪
Speed	Sprint ٣٠ meters from a moving start	Seconds	٣.٦٧	٠.٤١٤	٣.٣٥	٠.٤٩٣	٢.٨٩	٠.٥٣١	٢١.٣٪

It is clear from table (٢) that:

There is a varied response to the arithmetic mean and the skewness values to the experimental group in the physical fitness tests under study, also there is an improvement percentage in the three measurements (pre- track- post).

Table (٣)

Improvement Percentages for Control Group in the Physical Variables (n =١٧)

Variables	The Physical Fitness Test Selected	The Measurement Unit	Pre		Track		Post		Improvement Percentages (Pre/Post)
			Mean	St. D	Mean	St. D	Mean	St. D	
Coordination	Numbered circles	Seconds	٨.٦٩	٢.٠١	٨.٣٧	١.٧١	٧.٣٨	١.٦٧	١٥.١٪
Flexibility	The torso flexion back test from standing	Cm	٥٦.١١	٥.١٧	٥٦.١١	٣.٠٥	٥٦.٨٨	٦.٤٧	١.٤٪
Arm Strength	Throw a medicine ball with arms over the head from a standing position (weight ٣ kg)	M/Cm	٤.٨١	٠.٨٥٣	٤.٩٦	٠.٧٤٥	٥.٤٥	١.٠٢	١٣.٣٪
Leg Muscular Power	Jumping from standing	M/Cm	١.٥٢	٠.١٥٥	١.٥٦	٠.١٦٥	١.٧٢	٠.٣٨٥	١٣.٢٪
Speed	Sprint ٣٠ meters from a moving start	Seconds	٣.٧٧	٠.٤٠٧	٤.٠٨	٠.٢٨٤	٣.٥٣	٠.٥٩٤	٦.٤٪

It is clear from table (٣) that:

There is a varied response to the arithmetic mean and the skewness values to the control group in the physical fitness tests under study, also there is an improvement percentage in the three measurements (pre- track- post).

Table (٤)

The Differences between the two measures in the Technical level and Improvement Percentage for each group (n = ٣٤)

Group	Pre Measurement		Post Measurement		Indication	T	Percentage
	Mean	St. D	Mean	St. D			
Experimental	٤.٣٢	٠.٩٣٠	٧.٠٨	٠.٨٥٢	٠.٠٠٠	١٠.٦٥ *	٦٣.٨%
Control	٤.٣٥	١.٣٢	٥.٥٥	١.٤٠	٠.٠٠٠	* ٥.٤٥	٢٧.٥%

*Indication > ٠.٠٥

It is clear from Table (٤) that:

There are statistically significant differences between the two measurements for each group separately in favor of the post measurement, the percentage of improvement for the experimental group came (٦٣.٨%), while the percentage of improvement for the control group came with (٢٧.٥٪) in the technical level.

Discussion:

In light of the purpose, the research questions and within the limits of the sample, the results of the research will be discussed according to its hypotheses:

• Discussing the results of the first hypothesis, which states that **"There are statistically significant differences between the three measurements (pre- trace - post) in measuring the physical variables under study for both groups (experimental and control)".**

It is clear from table (٢) and table (٣) that there is an improvement rate for the target physical variables in the program for each group, as the program worked in improving the physical fitness components of the javelin throwing competition: coordination - arm strength - legs muscular power - speed - flexibility through various exercises using stations method differentiated levels and the improvement percentage of the experimental group were better than the control group, as the improvement percentage was between the pre and post measurements differed according to the different components of physical fitness for the experimental group, where

the coordination element improved by (٤٦.٣٪), followed by legs muscular power that improved by (٣٨.١٪), then arm strength improved by (٢٧.٧٪), then speed improved by (٢١.٣٪), and finally flexibility improved by (١١.١٪), meaning that all fitness components in the program has improved. The most improvement was the coordination component; this explains the importance of stations method differentiated levels.
The researchers attribute the great improvement for coordination component to that the students of the second grade take a lot of practical lectures beside field and track competitions course, basketball, volleyball and handball courses and therefore the chance of improving the coordination component is very large, as the student always works using her hand with her eyes with the tool (ball) in other courses and thus improves the coordination, in addition to the proposal program that works to develop physical fitness components under the program, while flexibility came in the last place, as the application of this program took only two months and to develop flexibility, it needs more time significantly to adapt. As for the control group, the coordination improvement percentage came by (١٥.١٪) and flexibility component improved by (١.٤٪), as a result of attending the students the practical lectures in the faculty playground.

This is consistent with what **Afaf Abdel Karim (٢٠٠٠) (١)** indicated that the stations method differentiated levels has become an important strategy in teaching physical education, as if it is used well, it gives a framework for learning experiences that meet the demands of all teaching functions.

This result is consistent with the study of **"Nasser Mustafa and Othman Mustafa" (٢٠٠٥) (٤)** where the use of stations method differentiated levels had a positive impact on the physical, health, skill and self-concept variables in physical education lesson for the experimental group.

• Discussing the results of the second hypothesis, which states that **"There are statistically significant differences between the pre and post measurements in the technical level of both groups (Experimental and Controlled)".**

It is clear from table (٤) that there are statistically significant differences between the two measurements for each group separately in favor of the post measurement, as the arithmetic mean of the control group

in the pre-measurement was (٤.٣٥) and in the post measurement became (٥.٥٥), meaning that the improvement in performance level amounted to (٢٧.٥٪) because this group takes theoretical and practical lectures, besides the faculty members applied the javelin throwing competition with the students using real javelin and explained each part of the technical performance of this competition. While the arithmetic mean of the experimental group in the pre-measurement was (٤.٣٢) and the post measurement became (٧.٠٨), meaning that the improvement in performance level amounted to (٦٣.٨٪), because the students of the experimental group were subjected to the proposed program using stations method differentiated levels which contained with various exercises directed to the goal of the program within the parts of the educational unit for a period of two months for (٢٤) units, (٣) units per week for a period of (٩٠) minutes to develop physical fitness components under the program (coordination – leg muscular power - arm strength - speed and flexibility) and this positive effect will be reflected on the students' skill state in learning process, which will lead to an improvement in their technical level in the javelin throwing competition, in addition to their presence in practical and theoretical lectures, understanding, watching models and listening to the detailed explanation of each step of the competition. From here their level has improved significantly, which indicates the effectiveness of using stations method differentiated levels.

This is supported by what was pointed out by "**Ahmed Mohamed Abdel Aziz" (٢٠٠٧)(٣)** which showed that stations method differentiated levels is one of the most important methods used in teaching physical education, which contributes to the advancement of the technical level and physical performance, where by pictures are used for teaching skills to students, attached to the instructions and hanging on tripods inside the playground to be easy for students to see and implement. (٣٣٥)

This result is consistent with the study of "**Ahmed Mahmoud Hassan" (٢٠١٧) (٧)** where using stations method differentiated levels had a positive impact on skill performance level for the experimental group and more influential than the traditional method with explaining model in some gymnastics skills in physical education lesson for primary school students. And with the study of **"Raed Faeq and Gevat Cecilia" (٢٠١٧) (١١)** were

the stations method differentiated levels has a positive effect on some of the physical components and special collection kinetic of the effectiveness on the long jump competition for the research sample.

Also the study of **"Mohammed Ibrahim Ali" (٢٠٢٠) (٩)** where the proposed educational program using stations method differentiated levels supported by the interactive video, achieved the expected goals (physical skill and the numerical level) with a higher percentage to the experimental group than the traditional program that was used with the control group and with the study.

Conclusions:

١. Stations method differentiated levels has a positive effect on some of the physical components' development of the javelin throwing competition for the experimental group, where the highest improvement percentage was for the Coordination component (٤٦.٣%), while the lowest improvement percentage was for the Flexibility component (١١.١٪).

٢. Stations method differentiated levels contributed to improve the technical level of the javelin throwing competition for the experimental group.

Recommendations:

In light of the results and conclusions of the research, the researchers recommend:

١. The necessity of including stations method differentiated levels in teaching and learning motor skills for students in faculties of physical education in all the Egyptian Universities and to be included in their academic courses content.

٢. Interest in holding training courses for physical education teachers in different educational stages on how to use modern teaching methods.

٣- More researches should be carried out using stations method differentiated levels on samples and other variables for different educational stages.

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This research aims to know the effect of using stations method differentiated levels on developing some physical components and improving the technical level of the javelin throwing competition. The two researchers used the experimental method for two groups, with the pre, trace and post measurements for each group. The Research Community is represented in students of the second grade at Faculty of Physical Education for Girls - Helwan University for the academic year (٢٠٢٠/٢٠٢١). Their number is (٣٤) student, the sample was divided randomly into two equal groups, each one consisted of (١٧) student. The data collection tools were forms for students: including (height, weight and age). IQ test was applied, it consists of (٩) different tests. Tools and Devices used, such as: medical scale, rastmeter, stopwatch and a tape measure and tools for applying physical fitness tests, like: medical balls, swedish chairs and collars. An expert opinion survey form to take their views on choosing the best five physical fitness components of the javelin throwing competition, in addition to the technical level of the javelin throwing competition for the students was evaluated through an evaluation form, which prepared in advance. This arbitration was done by a tripartite committee consisting of three Dr. Professors from training field and track competitions department.
The proposed educational program was applied for (٦٠) days with (٣) units per week in total (٢٤) unit. The most important results were that stations method differentiated levels has a positive effect on some of the physical components' development of the javelin throwing competition for the experimental group, where the highest improvement percentage was for the Coordination component (٤٦.٣٪), while the lowest improvement percentage was for the Flexibility component (١١.١%), it also contributed to improve the technical level of the javelin throwing competition for the experimental group.