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Dr. Firas Talaat Hussain
General Directorate of Education, Baghdad, Karkh II / Ministry of Education, Iraq

Corresponding Author:
Dr. Firas Talaat Hussain
General Directorate of Education, Baghdad, Karkh II / Ministry of Education, Iraq

The effect of active learning using total and partial exercise scheduling on learning the 110m hurdles

Firas Talaat Hussain

Abstract
The purpose of this paper is to identify the effect of active learning when using two exercise scheduling methods (total exercise and partial exercise) in teaching the 110-meter hurdles event to vocational preparatory school students. This type of complex and compound activity requires a high compatibility between motor and physical abilities and a good intellectual and cognitive level of the student, which makes it necessary to study the best learning methods and approaches appropriate for it. The research problem lies in the difficulty of determining the best method for teaching the 110-meter hurdles event, as many teachers and instructors rely on traditional methods that may not be compatible with the nature of the complex skill. There is also an ongoing debate about which exercise scheduling - total or partial - is more effective when combined with active learning strategies, which necessitated the need to research this aspect. The researcher used the experimental method because it is the most appropriate method for obtaining results. The research community consisted of vocational preparatory school students for sports sciences, with a total of (66) students from the original community. A group of students was excluded to conduct the exploratory experiment on them. The results showed that both types of exercise scheduling - when combined with active learning methods - have a positive effect on Learning effectiveness, and the most important results were that active learning combined with scheduling full and partial training is one of the excellent teaching methods that has proven effective in learning the 110-meter hurdles event. The researcher recommends adopting active learning in teaching complex events using full and partial training, because it increases interaction, motivation, and motor achievement, in addition to problem-solving among learners, and avoids methods of memorization and indoctrination.

Keywords: Learning, exercise, partial, effectiveness, hurdles

Introduction
The educational aspect is considered one of the most important and fundamental aspects in creating and preparing an aware and productive generation. Modern educational processes rely on creative approaches to learning, teaching, and pedagogy, using various methods and techniques. They also focus on developing and enhancing students' thinking skills in a diverse and distinctive manner that stimulates thought in all its forms and forms. This requires teachers responsible for the educational process to work on educating students according to advanced teaching plans and strategies that work to deliver knowledge to them in an engaging manner that encourages them to attend school and learn (Al-Hajj and Hassan Khalil, 2016) [30]. Active learning is the adoption of a modern method for conveying and transferring information from teacher to student, working to acquire additional skills. Active learning is a type of learning that allows students to be more directly involved in conveying learning than other traditional methods (Abdelsalam, 2021) [24]. The main difference between active learning and traditional learning is that active learning relies on the student himself to find solutions, think, and present visions to solve problems. In contrast, in traditional learning, the teacher or instructor delivers the entire lesson, while the students are passive (Al-Hankasi). Curriculum experts confirm that active learning is one of the modern trends that gives the learner an important and positive role in the learning process, as it provides the opportunity for creativity, learning, decision-making, problem-solving, and practicing different types of thinking (Ramadan, 2016) [21]. Therefore, the method that relies on imitation, i.e. the teacher, is no longer sufficient for the purpose of conveying information to learners and is currently relevant due to the technological development in the world of various mathematical sciences, and in physical education lessons

in particular. (Jamal Kseili and Ochan Bou Zaid, 2018) [15] State that traditional methods do not meet practical educational needs, i.e. they have become inadequate, and it is necessary to shift from passive learning, i.e. from memorization and indoctrination, to effective cooperation and give the learner an active role. Therefore, active learning is an important method nowadays, due to the scientific advancements taking place worldwide. It contributes effectively to the development of the educational process. Active learning is defined as a teaching and learning method that involves simultaneous participation in exercises and activities within a multi-disciplinary learning environment, with the presence of a teacher who encourages learners to assume responsibility for their own learning (Jawdat *et al*., 2010) [28] and (Qabil, *et al*., 2020) [13].

Choosing the two exercise scheduling methods (whole or partial exercise) is a fundamental factor in the motor learning process, especially when teaching simple, compound, and complex skills. Whole exercise refers to practicing the entire skill as a single unit and is preferred when teaching simple skills or those consisting of a series of closely interconnected movements. Partial exercise, on the other hand, relies on dividing the skill into small parts, each taught and practiced separately, then gradually assembled to form the complete skill. It is typically used for complex or long-term skills (Magill & Anderson, 2017) [19]. Therefore, total and partial training depends on the learner's proficiency, mastery, and skill, as well as the type of athletic activity and skills in choosing the appropriate method for mastering the task and motor performance. Al-Dulaimi (2008) [26] states that any learner with previous experience in the activity to be learned will use one of two methods: total or partial training, depending on the ease and difficulty of the skill being learned. The (110) meter hurdles event is considered one of the approved events in track and field competitions and is classified as a hurdle race, combining the requirements of high speed, technical accuracy, and motor coordination. This event relies on the runner's ability to run at maximum speed while overcoming ten hurdles distributed along the track (Brown & Ferrigno, 2005) [9]. Studies indicate that optimal performance in this event depends on the technical technique for overcoming the hurdle, as well as the number of steps between the hurdles, which is often three fixed steps, reflecting the importance of motor rhythm and economy of effort (Al-Khatib, 2002) [6]. The runner must maintain his speed while crossing regularly distributed obstacles, which requires precise training that includes elements of strength, speed, and flexibility, in addition to movement control and balance (Mcfarlane, 2000) [22].

The importance of this research lies in its use of active learning, based on the two methods of scheduling total and partial training, to provide effective learning that contributes to developing learners' technical performance with minimal effort and using scientific methods. It also guides teachers to use modern teaching methods. Today, the world is witnessing technological advancements in various sports sciences, one of which is motor learning, which no individual can ignore, regardless of their level of achievement, ranging from high achievement to the lowest sports unit, namely the educational units of physical education in schools.

Research problem

The 110-meter hurdles event is considered a complex event in athletics, as it requires a high degree of harmony between physical abilities and fine motor skills, as well as temporal and spatial awareness during performance. Many physical education teachers and instructors face challenges in effectively conveying this skill to students, especially given the varying abilities and rapid response of learners to instruction. On the other hand, the field of education is witnessing significant development in the adoption of modern methods and approaches, one of the most prominent of which is the active learning approach, which is considered a contemporary trend in education. It focuses on engaging students in the learning process through collaborative and interactive activities that stimulate thought and enhance understanding and application. However, the application of this approach requires its integration with appropriate learning and training methods, including scheduling training in both its comprehensive and partial forms. These are two approved methods for teaching complex skills. Comprehensive training relies on teaching the skill as a whole without dividing it, while partial training focuses on dividing the skill into parts that are taught separately before linking them. Despite the existence of studies on both active learning and comprehensive and partial training, there is still a deficiency in integrating these methods within a single study to teach the 110-meter hurdles event, and measuring the extent of their impact on developing students' motor and cognitive performance. Hence, the research problem is determined in an attempt to reveal the effect of active learning when used with the two methods of exercise scheduling (full and partial) in learning the 110-meter hurdles skill among students of the vocational preparatory stage, as well as the fact that the educational environment is different for learners in the vocational preparatory school for sports sciences, as they were accepted for the first year in it, in addition to the researcher noticing, through field visits, the lack of use of modern educational methods in track and field games by the physical education teacher.

Research objective

- To identify the effect of active learning using a total and partial training schedule on learning the 110m hurdles event.
- Comparing total training and partial training with the traditional method when used in active learning for the 110m hurdles event.

Research hypotheses

- There are statistically significant differences between the results of the pre- and post-tests for the 110m hurdles event for the technical performance stages of the three groups.
- There are differences between the three groups in the post-tests, favoring the second group, which used active learning according to the partial training schedule.

Research fields

- Human field: First-year students of the Vocational Secondary School for Mathematical Sciences, Karkh I Education Directorate.
- Time field: The second semester of the 2024-2025 academic year, from February 12, 2025, to April 10, 2025.
- Spatial field: The Vocational Secondary School for Mathematical Sciences Stadium, Karkh I Education Directorate.

Research methodology and field procedures

Research Methodology

The researcher used the experimental method due to its suitability to the nature of the study.

Community and sample research

The research sample consisted of the original community, which consisted of (66) students from the first stage (first vocational) Vocational Secondary School for Mathematical Sciences - of the General Directorate of Education in Baghdad, Karkh I, for the second semester of the academic year (2024-2025). The sample was chosen intentionally, as the secondary school was newly established and consisted of two sections (A and B). One section, Section (A), was chosen by lottery to conduct the research. After excluding irregular and absent students, the number of students in the class became (30) students, who represent the research sample. They were distributed into three groups, each consisting of (10) students. Two groups were experimental, and the third was a control group. They were chosen randomly. The sample was divided randomly by lottery. Group (A) represented the first experimental group and used the total exercise, with total of (10) students. Group (B) represented the second experimental group and used the partial exercise, with total of (10) students. Group (c) represented the control group, which consisted of (10) students. In order to ensure sample homogeneity, the researcher extracted the arithmetic mean, median, standard deviation, and skewness coefficient for the research sample for age, height, and weight. The results showed the homogeneity of the sample, as it was limited to (± 3), as shown in Table (1).

Table (1) shows the homogeneity of the research sample members.

No.	Variables	Mean	Median	Std. Deviations	Skewness
1	Age	13.076	13.050	0.852	0.488
2	Height	148.12	148.00	0.439	0.675
3	Mass	41.894	42.000	0.648	0.101

To ensure the equivalence of the sample in terms of technical performance, and to start with a single starting point between the three research groups, the one-tailed analysis of variance (F) was used to identify the differences in technical performance levels between the three groups.

Table 2: Shows the analysis of variance for the technical performance stages of the 110-meter hurdles event in the pre-test for the purpose of equivalence between the research groups.

Stages	Source of variance	Sum of squares	Degrees of freedom	Mean squares	F value	Level Sig	Type Sig
Start and go	Between Groups	.518	2	.259	.966	.394	non sig
	Within Groups	7.242	27	.268			
	Total	7.760	29				
Approach and sprint from the starting line to the first hurdle.	Between Groups	.145	2	.072	.848	.439	non sig
	Within Groups	2.302	27	.085			
	Total	2.447	29				
Crossing the hurdle	Between Groups	.446	2	.223	.462	.635	non sig
	Within Groups	13.037	27	.483			
	Total	13.483	29				
Three steps between hurdles	Between Groups	.195	2	.097	.414	.665	non sig
	Within Groups	6.344	27	.235			
	Total	6.539	29				
Landing and running from the last hurdle to the finish line							non sig
	Between Groups	.085	2	.042	.204	.817	
	Within Groups	5.602	27	.207			

From Table (2), it is clear that the calculated F-test values for the technical performance stages of the 110-meter hurdles event among the three groups in the pretest ranged between (0.966-0.204), with an error level of (0.817-0.394), and a degree of freedom of (2-27), indicating insignificant differences between the three groups.

Devices and Tools Used in the Research

Data Collection Methods

- Personal Interview.
- Scientific Sources.
- Technical Performance Level Evaluation Form for the 110-meter hurdles event.
- Technical Performance Results Recording Form.
- Age, Height, and Weight Recording Form.
- Internet.
- Tests and Measurements.
- Statistical Methods.

Equipment and tools used in the research:

- 110-meter hurdles running track.
- (2) Measuring tapes.
- (2) Whistles.
- (2) Dell calculators.
- (2) Stopwatches.
- (10) Legal jumping hurdles.
- (16) Indicators and cones.
- (12) Rubber ropes.
- (10) Pegs.
- (10) Hoops.
- Agility pegs, a fitness ladder.
- Medical scale.
- Stadiometer.
- Modern iPhone (15) mobile phone.
- (10) Tape markers.

Field Research Procedures

110-meter Hurdles Test (Rashid, 2009).

This test was used to assess learners' technical performance, not achievement. A pre-test and post-test were administered to all sample members.

- Test Name: Achievement Test for the (110)-meter

Hurdles Event.

- Test Objective: To measure achievement in the (110)-meter hurdles.
- Test Method: From a low starting position, the runner assumes the starting position and holds, after receiving the "Get Ready" command. He then sets off from the starting line after hearing the "whistle" from the starter to clear the ten hurdles and reach the finish line in the shortest possible time.
- Recording method: All runners perform the test in succession, starting from the first runner to the tenth runner. After the last runner finishes performing the test, the runners begin performing the test again in the same sequence. The numbers achieved for each attempt are recorded in a special register in front of each runner's name. That is, two attempts are recorded for each runner, and the best is considered.

Exploratory experiment

This is an initial stage in scientific research aimed at testing research tools and uncovering potential problems in the study design, such as the validity of questionnaires or difficulty understanding instructions. It also helps determine the time required for implementation and estimate the appropriate sample size. Exploratory experiments are often conducted on a small sample from the same research population to ensure the readiness of the study tools before full implementation (Al-Khatib and Marai, 2020) [5].

The researcher conducted the exploratory experiment on a group of first-year students in the vocational secondary school for mathematics at the First Karkh Education Department. They were excluded from the research sample. The exploratory experiment was conducted in the vocational secondary school playground at 10:00 a.m. on Wednesday, February 12, 2025, during the second semester. Its objectives were to:

- Identify the duration of work and rest for each lesson.
- Verify the validity of the auxiliary tools, equipment, and playgrounds.
- Prepare and train the support team.
- Assess the sample's performance capacity.
- Ensure the safety of the equipment used in the research.

Technical Performance Evaluation Form for the 110m Hurdles Event

The researcher prepared a technical performance evaluation form for the 110m hurdles event, after consulting the experts who evaluated the research sample, as shown in Appendix (1) of the form. They also distributed scores for each stage of the technical performance of the 110m hurdles event, as shown in Appendix (2). The test stages were divided into two points each.

- **Stage 1:** (Start and go).
- **Stage 2:** (Approach and sprint from the starting line to the first hurdle**.**).
- **Stage 3:** (Crossing the Hurdle).
- **Stage 4:** (Three steps between hurdles).
- **Stage 5:** (Landing and running from the last hurdle to the finish line).

Pre-tests

The pretests were conducted on Sunday, February 16, 2025, at 10:00 a.m. for the research sample at the Vocational Secondary School for Mathematical Sciences. The researcher worked to establish the specific conditions for the tests, including time, location, tools used, test implementation method, and test administrators, in order to create, as much as possible, similar conditions for the posttests.

Main Experiment

The main experiment was conducted from February 18, 2025 to April 8, 2025. The researcher used active learning, based on both total and partial training, to learn the 110-meter hurdles. He drew on scientific sources related to athletics, as well as the opinions of experts and specialists in the field of motor learning and athletics. The researcher employed modern methods and techniques that aim to raise the educational level of students in learning the 110-meter hurdles. Suleiman (2025) [4] asserts that active learning strategies, such as immediate feedback, competitive play, and collaborative assessment, positively impact learners' motor skill acquisition, particularly in athletics. (16) Educational units were implemented using a curriculum design for the two experimental groups. The duration of each educational unit was (60) minutes, given that the school was a sports school, not a traditional one, as is the case in middle and high schools. The sample was divided into three groups, working as follows:

The first group used active learning based on a total exercise. Learners performed the exercise for the activity to be learned as a whole, relying on the teacher's discussions and guidance, and discussing it with each other. They recorded their attempts on their mobile devices and reviewed the presentation. The group was divided into small groups.

The second group used active learning based on a partial exercise. Learners performed the exercise for the activity to be learned partially. Each skill was performed separately, and they relied on and discussed it with the teacher, as well as guidance and discussion among themselves. This was done by recording their attempts on their mobile devices and reviewing the presentation. Before the end of the educational units, the previous skills were linked together. The group was divided into small groups.

The third group used traditional learning. The teacher explained the skill, and the learners applied it.

Table (3) shows the work of the research groups.

No.	Groups	Test	Methods	Test
1	Experimental group (A)	Pre-test	Active Learning for the 110m Event (Total Training)	Post-test
2	Experimental group (B)	Pre-test	Active Learning for the 110m Event (Partial Training)	Post-test
3	Control group (C)	Pre-test	Traditional Learning for the 110m Event (Approach Followed)	Post-test

Post-test

The experimental application for measuring research variables is one of the most important foundations of the research. Post-tests are a pivotal tool in experimental design for measuring the impact of educational interventions (Shuttleworth, 2025) [17]. After completing the application of learning the (110) meter hurdles using the total and partial training method for (8) weeks, the researcher conducted post-tests to determine

the level reached by the research sample. The post-tests were conducted on vocational secondary school students for sports sciences, who represented the research sample in experimental and control groups (A-B-C). The post-tests were conducted on Thursday, April 10, 2025, at the vocational secondary school playground for sports sciences. The researcher ensured that the work was available and maintained in the same location, with the same tools and conditions as those previously applied in the pre-test, to avoid any differences between the pre- and post-tests.

Statistical Methods

The researcher used the statistical package (SPSS) to extract appropriate statistical treatments and obtain the results.

Results and discussion

Presentation, analysis, and discussion of the arithmetic means, their standard deviations, the difference between them, the calculated t-value, and the significance of the differences between the two tests: pre- and post-tests, for the first experimental group (total exercise) in the research variables:

Table 4: Shows the arithmetic means, their standard deviations and the difference between them, the calculated (t) value, and the significance of the differences between the two tests: pre- and post-tests, for the first experimental group (total exercise) in the research variables:

Stages	Pre-test		Post-test		Arithmetic mean of difference	Standard deviation of differences	T value calculated	Level Sig	degree of freedom	Type Sig
	Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation						
Start and go	7.620	0.493	16.600	0.658	8.980	.6520	43.497	0.000	9	Sig
Approach and sprint from the starting line to the first hurdle	6.150	0.212	14.150	0.241	8.000	.3460	73.030	0.000	9	Sig
Crossing the hurdle	6.510	0.796	12.800	1.135	6.290	1.025	19.392	0.000	9	Sig
Three steps between hurdles	5.580	0.541	12.550	0.437	6.970	.4870	45.190	0.000	9	Sig
Landing and running from the last hurdle to the finish line	7.370	0.462	14.690	0.150	7.590	.4840	49.582	0.000	9	Sig

Table (4) shows that the arithmetic means between the results of the pre- and post-tests for the first experimental group (total exercise) in the research variables (starting and setting off, approaching and running from the starting line to the first hurdle, crossing the hurdle, three steps between the hurdles, landing and running from the last hurdle to the finish line) were (7.620), (6.150), (6.510), (5.580), (7.370) for the pre-test, respectively, and were (16.600), (14.150), (12.800), (12.550), (14.690) for the post-test, respectively, with standard deviations of (0.493), (0.212), (0.796), (0.541), (0.462) for the pre-test, respectively, and were (0.658). (0.241), (1.135), (0.437), (0.150), for the post-test respectively, while the difference in arithmetic means between the results of the two tests reached (8.980), (8.000), (6.290), (6.970), (7.590), respectively, with standard deviations of the differences reaching (0.652), (0.346), (1.025), (0.487), (0.484), respectively, and the calculated (t) values reached (43.497), (73.030), (19.392), (45.190), (49.582), respectively, while the error level was (0.000), respectively, is less than the error rate (0.05), in front of a degree of freedom (9), and this indicates the significance of the differences between the two tests Pre- and post-tests, and for the benefit of the post-test, were conducted on all research variables for the first experimental group.

Presentation, analysis, and discussion of the arithmetic means, their standard deviations, the difference between them, the calculated t-value, and the significance of the differences between the two tests: pre- and post-tests, for the second experimental group (partial exercise) on the research variables:

Table 5: Shows the arithmetic means, their standard deviations and the difference between them, the calculated (t) value, and the significance of the differences between the two tests: pre- and post-tests, for the second experimental group (partial exercise) in the research variables:

Stages	Pre-test		Post-test		Arithmetic mean of difference	Standard deviation of differences	T value calculated	Level Sig	degree of freedom	Type Sig
	Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation						
Start and go	7.850	0.529	17.100	0.516	9.250	.8240	35.458	0.000	9	Sig
Approach and sprint from the starting line to the first hurdle	6.230	0.249	14.870	0.283	8.640	.4690	58.192	0.000	9	Sig
Crossing the hurdle	6.460	0.741	13.400	1.505	6.940	1.257	17.457	0.000	9	Sig
Three steps between hurdles	5.760	0.529	13.530	0.887	7.770	1.201	20.443	0.000	9	Sig
Landing and running from the last hurdle to the finish line	7.300	0.426	17.800	0.421	9.500	.7180	41.839	0.000	9	Sig

Table (5) shows that the arithmetic means between the results of the pre- and post-tests for the first experimental group (total exercise) in the research variables (starting and setting off, approaching and running from the starting line to the first hurdle, crossing the hurdle, three steps between the hurdles, landing and running from the last hurdle to the finish line) were (7.850), (6.230), (6.460), (5.760), (7.300) for the pre-test, respectively, and were (17.100), (14.870), (13.400), (13.530), (17.800) for the post-test, respectively, with standard deviations of (0.529), (0.249), (0.741), (0.529), (0.426) for the pre-test, respectively, and were (0.516). (0.283), (1.505), (0.887), (0.421), for the post-test

respectively, while the difference in arithmetic means between the results of the two tests reached (9.250), (8.640), (6.940), (7.770), (9.500), respectively, with standard deviations of the differences reaching (0.824), (0.469), (1.257), (1.201), (0.718), respectively, and the calculated (t) values reached (35.458), (58.192), (17.457), (20.443), (41.839), respectively, while the error level was (0.000), respectively, is less than the error rate (0.05), in front of a degree of freedom (9), and this indicates the significance of the differences between the two tests. Pre- and post-tests, and for the benefit of the post-test, are presented in all research variables for the second experimental group.

Presentation, analysis, and discussion of the arithmetic means, their standard deviations, the difference between them, the calculated t-value, and the significance of the differences between the two tests: pre- and post-tests, for the experimental (control) group, on the research variables

Table (6) shows the arithmetic means, their standard deviations and the difference between them, the calculated (t) value, and the significance of the differences between the two tests: pre- and post-tests, for the experimental (control) group in the research variables:

Stages	Pre-test		Post-test		Arithmetic mean of difference	Standard deviation of differences	T value calculated	Level Sig	degree of freedom	Type Sig
	Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation						
Start and go	7.850	0.529	17.100	0.516	9.250	.8240	35.458	0.000	9	Sig
Approach and sprint from the starting line to the first hurdle	6.230	0.249	14.870	0.283	8.640	.4690	58.192	0.000	9	Sig
Crossing the hurdle	6.460	0.741	13.400	1.505	6.940	1.257	17.457	0.000	9	Sig
Three steps between hurdles	5.760	0.529	13.530	0.887	7.770	1.201	20.443	0.000	9	Sig
Landing and running from the last hurdle to the finish line	7.300	0.426	17.800	0.421	9.500	.7180	41.839	0.000	9	Sig

Table (6) shows that the arithmetic means between the results of the pre- and post-tests for the first experimental group (total exercise) in the research variables (starting and setting off, approaching and running from the starting line to the first hurdle, crossing the hurdle, three steps between the hurdles, landing and running from the last hurdle to the finish line) were (7.930), (6.320), (6.740), (5.740), (7.430) for the pre-test, respectively, and were (15.100), (12.280), (10.500), (11.050), (12.900) for the post-test, respectively, with standard deviations of (0.529), (0.385), (0.514), (0.362), (0.467) for the pre-test, respectively, and were (1.197). (1.660), (0.527), (0.158), (1.523), for the post-test respectively, while the difference in arithmetic means between the results of the two tests reached (7.170), (5.960), (3.760), (5.310), (5.470), respectively, with standard deviations of the differences reaching (0.721), (1.883), (0.406), (0.428), (1.552), respectively, and the calculated (t) values reached (31.439), (10.004), (29.281), (39.229), (11.145), respectively, while the error level was (0.000), respectively, is less than the error rate (0.05), in front of a degree of freedom (9), and this indicates the significance of the differences between the two tests Pre- and post-test and in favor of the post-test in all research variables for the experimental control group.

Presentation and analysis of the results of the analysis of variance test for the technical performance stages of the 110-meter hurdles event in the post-test

Table (7) Analysis of variance for the technical performance stages of the 110-meter hurdles event in the post-test between the three research groups

Stages	Source of variance	Sum of squares	Degrees of freedom	Mean squares	F value	Level Sig	Type Sig
Start and go	Between Groups	21.667	2	10.833	15.234	.000	Sig
	Within Groups	19.200	27	.711			
	Total	40.867	29				
Approach and sprint from the starting line to the first hurdle.	Between Groups	35.745	2	17.872	18.516	.000	Sig
	Within Groups	26.062	27	.965			
	Total	61.807	29				
Crossing the hurdle	Between Groups	46.867	2	23.433	18.339	.000	Sig
	Within Groups	34.500	27	1.278			
	Total	81.367	29				
Three steps between hurdles	Between Groups	31.203	2	15.601	46.643	.000	Sig
	Within Groups	9.031	27	.334			
	Total	40.234	29				
Landing and running from the last hurdle to the finish line		76.131	2	38.065	45.268	.000	Sig
	Between Groups	22.704	27	.841			
	Within Groups	98.835	29				

Table (7) shows that the calculated F test values for the technical performance stages of the 110-meter hurdles event among the three groups in the post-test were (15.234 - 18.516 - 18.339 - 46.643 - 45.268) at the error level of (0.000) for all technical performance stages, corresponding to degrees of freedom (2-27). This indicates the significance of the differences between the three groups in the technical performance stages of the 110-meter hurdles event under study in the post-test.

To determine the differences between the three groups under

study, the researcher used the least significant difference (LSD) test to determine these differences, as shown in the table below.

Presentation, analysis, and discussion of the results of the least significant difference test between the three groups under study in the post-test of the 110-meter hurdles event

Table 8: Shows the least significant difference test between the three groups under study in the post-test of the 110-meter hurdles event:

Stages	Groups	Arithmetic mean	Arithmetic mean of difference	Error deviation	Level Sig	Type Sig
Start and go	(1) Total - (2) Partial	16.600-17.100	0.500	0.377	0.196	Non sig
	(1) Total - (3) Control	16.600-15.100	1.500*	0.377	0.000	Sig
	(2) Partial - (3) Control	17.100-15.100	2.000*	0.377	0.000	Sig
Approach and sprint from the starting line to the first hurdle.	(1) Total - (2) Partial	14.150-14.870	0.720	0.439	0.113	Non sig
	(1) Total - (3) Control	14.150-12.280	1.870*	0.439	0.000	Sig
	(2) Partial - (3) Control	14.870-12.280	2.590*	0.439	0.000	Sig
Crossing the hurdle	(1) Total - (2) Partial	12.800-13.400	0.600	0.505	0.246	Non sig
	(1) Total - (3) Control	12.800-10.500	2.300*	0.505	0.000	Sig
	(2) Partial - (3) Control	13.400-10.500	2.900*	0.505	0.000	Sig
Three steps between hurdles	(1) Total - (2) Partial	12.550-13.530	0.980*	0.258	0.001	Sig
	(1) Total - (3) Control	12.550-11.050	1.500*	0.258	0.000	Sig
	(2) Partial - (3) Control	13.530-11.050	2.480*	0.258	0.000	Sig
Landing and running from the last hurdle to the finish line	(1) Total - (2) Partial	14.960-16.800	1.840*	0.410	0.000	Sig
	(1) Total - (3) Control	14.960-12.900	2.060*	0.410	0.000	Sig
	(2) Partial - (3) Control	16.800-12.900	3.900*	0.410	0.000	Sig

Table (8) shows: The difference in the arithmetic means between the first group (total exercise) and the second group (partial exercise) for the first stage (start and launch) was (0.500), with an error deviation of (0.377) at an error level of (0.196), indicating the randomness of the differences between the two groups.

The difference in the arithmetic means between the first group (total exercise) and the third group (control) for the first stage (start and launch) was (1.500*), with an error deviation of (0.377) at an error level of (0.000), indicating the significance of the differences between the two groups, in favor of the total exercise group. The difference in the arithmetic means between the second group (partial exercise) and the third group (control) for the first stage (start and takeoff) was (2.000*), with an error deviation of (0.377) at an error level of (0.000), indicating the significance of the differences between the two groups, in favor of the partial exercise group.

The difference in the arithmetic means between the first group (total exercise) and the second group (partial exercise) for the second stage (approaching and running from the starting line to the first hurdle) was (0.720), with an error deviation of (0.439) at an error level of (0.113), indicating the randomness of the differences between the two groups. The difference in the arithmetic means between the first group (total training) and the third group (control) for the second phase (approaching and sprinting from the starting line to the first hurdle) was (1.870*), with an error deviation of (0.439) at the (0.000) level, indicating the significance of the differences between the two groups, in favor of the total training group.

The difference in the arithmetic means between the second group (partial training) and the third group (control) for the second phase (approaching and sprinting from the starting line to the first hurdle) was (2.590*), with an error deviation of (0.439) at the (0.000) level, indicating the significance of the differences between the two groups, in favor of the partial training group. The difference in the arithmetic means between the first group (total exercise) and the second group (partial exercise) for the third stage (crossing the hurdle) was (0.600), with an error deviation of (0.505) at an error level of (0.246), indicating that the differences between the two groups were random.

The difference in the arithmetic means between the first group (total exercise) and the third group (control) for the third stage (crossing the hurdle) was (2.300*), with an error deviation of (0.505) at an error level of (0.000), indicating that the differences between the two groups were significant, favoring the total exercise group.

The difference in the arithmetic means between the second group (partial exercise) and the third group (control) for the third stage (crossing the hurdle) was (2.900*), with an error deviation of (0.505) at an error level of (0.000), indicating that the differences between the two groups were significant, favoring the partial exercise group. The difference in the arithmetic means between the first group (total exercise) and the second group (partial exercise) for the fourth stage (three steps between hurdles) was (0.980*), with an error deviation of (0.258) at the (0.001) error level, indicating the significance of the differences between the two groups, in favor of the partial exercise group.

The difference in the arithmetic means between the first group (total exercise) and the third group (control) for the fourth stage (three steps between hurdles) was (1.500*), with an error deviation of (0.258) at the (0.000) error level, indicating the significance of the differences between the two groups, in favor of the total exercise group. The difference in the arithmetic means between the second group (partial training) and the third group (control) for the fourth stage (three steps between hurdles) was (2.480*), with an error deviation of (0.258) at the (0.000) level, indicating the significance of the differences between the two groups, in favor of the partial training group.

The difference in the arithmetic means between the first group (total training) and the second group (partial training) for the fifth stage (landing and sprinting from the last hurdle to the finish line) was (1.840*), with an error deviation of (0.410) at the (0.000) level, indicating the significance of the differences between the two groups, in favor of the partial training group.

The difference in the arithmetic means between the first group (total training) and the third group (control) for the fifth stage (landing and sprinting from the last hurdle to the finish line) was (2.060*), with an error deviation of (0.410) at the (0.000) level, indicating the significance of the differences between the two groups, in favor of the total training group.

The difference in the arithmetic means between the second group (partial training) and the third group (control) for the fifth stage (landing and sprinting from the last hurdle to the

finish line) was (3.900*), with an error deviation of (0.410) at the (0.000) level, indicating the significance of the differences between the two groups, in favor of the partial training group.

Discussion of the Results

The study results showed significant differences between the pre- and post-tests, favoring the post-tests in all research variables for the three groups. Any new learning acquired by learners, regardless of its method, style, or type, results in a change in behavior and motor performance due to meticulous practice and repetitions, at varying rates depending on the type of learning. Qasim (Lazam, 2005) [27] states that learning within the framework of motor tasks contributes to and facilitates development in the motor performance of the activity, regardless of its difficulty or ease, due to practice, which is considered one of the most important elements of learning. Therefore, the learning that occurred for learners was due to the practical application of the components of the educational units and the new environment, which helped in the careful application and implementation of the curriculum. Sources indicate that implementing skills and motor performance in reality helps raise the skill level of learners (Al-Sayyid and Muhammad, 2024) [25]. Regarding the post-tests between the groups, there were significant differences between the three groups and insignificant differences in some variables between the two experimental groups, as the significant superiority was clear for the partial training group and then the total training group over the control group. This is due to the use of the active learning method with the total and partial training methods within the educational program, as it helped improve the level of learning of the 110-meter hurdles event by increasing interaction, focus and active participation while learning the performance. Active learning developed the learners not only in terms of the motor performance of the event for practice, but also in terms of the intellectual aspect in learning the correct performance and innovation to achieve the maximum results from learning, relying on oneself and one's colleagues. (Mansouriya, and Hassan) mention that the exchange of roles between learners benefits from correcting mistakes between them in terms of decision-making and they are more responsible when learning. Dividing learners into small groups increased their interaction and cooperation within the same team, which enhanced self-confidence and positively interdependent learners, which increased learners' engagement in learning and made it more joyful and enjoyable. The first and second experimental groups had freedom for learners to make decisions and participate in discussions and debates to solve problems in motor performance with the teacher. (Jamal Kseili, and Rashid Bin Daghfal, 2015) [16] Quote from Mustain that learners are affected by the learning style in terms of their physical, personal, intellectual, psychological freedom and cognitive abilities. (Al-Rubaie, 2008) [20] Adds that learners' success does not depend on their weakness, but on their strength, and on cooperation rather than competition, and each one is responsible for the achievement of the other. The use of instant feedback has had a significant role in the development of learners, as the teacher and learners review and correct performance during the motor task by retrieving stored information from the nervous system to form the motor performance during its implementation. The incorrect performance is processed and recognized, if any, and the correct performance is reinforced by the group (Asaad, 2017) [11]. Providing feedback at the same time as the lesson contributes to knowing the learner's progress in performance.

When dividing skills according to the technical stages of the activity, in the first stage, the initiation and launch stage, the results indicated no significant differences between the two experimental groups. Furthermore, the differences were significant, with the two experimental groups outperforming the control group at this stage. This is due to the fact that active learning was implemented within an organized educational program in terms of sequential educational units and organized skill exercises. Furthermore, active learning had not previously been used on the research sample according to the total and partial exercises. Its foundations rely on explaining the skill, followed by practical application, and the participation of the learner, teacher, and learners among themselves in solving problems. This is in contrast to the traditional method, in which the learner is the recipient of the tasks. Buckley (2013) [8] indicates that organized and programmed learning, the use of modern methods, and optimal rest between performances lead to accelerating the learning process of the skill or activity. In the second stage, which is approaching the starting line to the first hurdle, the differences are not significant between the results of the post-tests between the total and partial exercise methods for scheduling the exercise. Furthermore, the differences are significant for the two experimental groups, who outperformed the control group in this stage, as the two experimental groups were more precise and practiced in organizing the approach steps due to observing the technical performance during the application and repetition of the exercises accurately during the educational units. Hammad (1994) [23] indicates that it is necessary for the student to achieve automatic performance of the skill through constant repetition of performing and using various exercises, which are characterized by changing conditions and external factors during the exercise, such as the presence of one or more hurdles, for example. In the third stage, crossing hurdles, the differences were not significant between the post-test results between the total and partial training methods for scheduling the exercise, and the differences were significant for the two experimental groups, who outperformed the control group in this stage. The total and partial training scheduling clearly outperformed the results. The reason for this is the process of correcting technical errors on an ongoing basis through continuous repetitions related to the timing of the jump, general motor coordination, and harmony between body parts, especially the leg, when crossing the hurdle. Repeating and performing these complete and partial motor patterns leads to similar results in skills that include precise transitional jumps (Wulf & Shea, 2002) [31]. During the fourth stage, the three-step stage between the hurdles, there was a clear superiority and significant difference between the partial training group and the total training group and the control group. This difference is due to the importance of using appropriate educational methods in learning activities and skills, especially complex ones. This stage requires repetition, motivation, thinking, focus, and continuous mental work by the learner to establish the motor pattern between the hurdles, as the partial training enhanced accuracy in the time intervals between the three steps between the hurdles, which is the basis of work in this activity. Therefore, the superiority of this group is due to the division of this skill, training, and repetition of it independently. This is consistent with what (Abdul Hussein, and Abdul Hussein, 2016) [29] indicate, that increasing repetition and diversity leads to the activation of the learner's mental processes, while the total training worked on learning the motor sequence as a whole, i.e. linking more

than one stage. Al-Lami (2006) [2] indicates that motor performance at the beginning of learning is full of errors, and with continued training, performance improves, and this is consistent with simple, uncomplicated motor skills. As for the control group, it suffered from weakness in organizing these steps as a result of the lack of focus on the correct motor pattern, as Magil (2010) [18] indicates that motor skills The sequence requires advanced cognitive processing that cannot be achieved through traditional education alone.

The fifth stage, the landing and running stage from the last hurdle to the finish line, had a clear significant difference between the two groups in the partial training group. The results, as in the previous tables, indicate that the active learning method with partial training helped consolidate the final skill in the event, which requires maintaining balance after landing and reaching the finish line without falling over the last hurdle. In this stage, the learner reached the stage of fatigue after crossing all previous hurdles, especially since some sources mention that the learner reaches a state of fatigue after the seventh hurdle. Studies also indicate that one of the basics of partial training is that the learner masters part of the event or the learned skill well and with high accuracy, relying on the motor and physical abilities he possesses that help him master the motor task. This is the principle of partial training in complex events due to the frequent repetition of the skill and the continuation of learning it, thus leading to good mastery of the skill. The researcher agrees with (Awad, 2020) [1] and (Dawlatly, 2005) [3] that the improvement of the skill and motor performance of sports skills comes as a result of the development of physical performance, meaning there is a soft relationship between them, i.e. Mastering motor performance requires continuous training, which refines technical performance completely and with high precision. Therefore, the learner relies on himself and the other learners in the same group, as well as the teacher's guidance. This research differs from what Muhammad (2006) [7] asserted, that complex and difficult skills tend to be learned using a commanding approach. Therefore, the study results showed that applying the active learning method, along with scheduling both total and partial training, contributed significantly and effectively to improving and developing the learners' skill performance in the 110-meter hurdles event. The partial group outperformed the technical performance stages for all research variables, while the total group excelled in the stages requiring complete motor coordination. As for the control group, the results indicated lower performance than both groups.

Conclusions and Recommendations

Conclusions

- Active learning clearly outperformed traditional methods, demonstrating that engaging the learner in the learning situation through thinking, problem-solving, observation, and discussion positively impacts the learning process of the 110m hurdles event.
- Active learning combined with scheduling both total and partial training is one of the excellent teaching methods that has proven effective in learning the 110m hurdles event.
- The results showed that the group that used partial training clearly outperformed the first and third experimental groups in all technical stages of the 110m hurdles event, especially in the fourth and fifth stages.
- The partial training was suitable for learners by dividing the event into several parts and then combining them.
- The experimental group that used total training was more developed in the performance stages that required integrated motor coordination than the control group.

Recommendations

- Adopt active learning in teaching complex events such as the 110m hurdles, as it increases interaction, motivation, and motor achievement, as well as problem-solving, and avoids rote memorization and indoctrination.
- Use partial training in the initial learning stages to develop technical details. It is preferable to use it when teaching precise stages, such as running between hurdles.
- Use total training in sequential performance stages. It is recommended to use total training, as these require continuity in motor performance.
- Instruct teachers to use active learning according to the schedule of total and partial training in an organized, academic, and systematic manner, avoiding traditional learning.
- Activate further field studies in other events by conducting future research on active learning and comparing fixed and variable training, random and sequential training, etc., across various sporting events.

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Appendix No. 1: Shows the names of the track and field specialists who set the grades for the stages.

Specialist Name	Academic Title	Specialization	Affiliations
Sarih Abdul Karim Al-Fadhli	Pro f.Dr.	Athletics	College of Physical Education and Sports Sciences - Ashur University
Ahmed Mohammed Ismail	Prof. Dr.	Athletics	College of Physical Education - University of Baghdad
Mohammed Jassim Mohammed	Prof. Dr.	Athletics	College of Education for Girls - University of Kufa
Alaa Jaber Abboud	Assist. Prof. Dr.	Athletics	Ministry of Education
Haider Nawar Hussein	Assist. Pro f.Dr	Athletics	Ministry of Education

Appendix No. (2) Shows the form prepared by the researcher and experts to evaluate the technical performance of the 110m track and field event.

No.	Start and go (2 degrees)	Approach and sprint from the starting line to the first hurdle (2 degrees)	Crossing the hurdle (2 degrees)	Three steps between hurdles (2 degrees)	Landing and running from the last hurdle to the finish line (2 degrees)
1					
2					
3					
4					
5					