

The effect of using assistive technologies on improving motor abilities for students with disabilities in the upper limb

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Abstract:

The research aims to improve the level of performance of motor abilities using assistive techniques for students with motor disabilities at the upper end, the researcher used the experimental method, using the experimental design of one experimental group by pre- and post-measurement to suit the nature of the research, the physically disabled students were selected in **the first preparatory** grade at Espats Private School as a total research community And their number is (26) students, and after the initial examination of the students in terms of strength and safety of body parts, (16) students were selected as an experimental group of students with motor disabilities in the first preparatory grade at Espats School in a deliberate way, and (10) students were selected as an exploratory group, in the first semester of the academic year (2022/2023), It was concluded that the proposed program has a positive impact on the level of performance of students with upper limb disabilities in:

1. Some motor abilities
2. Measurements of the range of motion of the upper limb (shoulder – elbow)
3. Skill tests (passing the ball - pushing a shot)

The researcher recommends the attention of the Ministry of Education to the physically handicapped in schools, and to conduct more studies on the uses of rehabilitation programs and their application in teaching various sports activities, and the application of assistive technologies in the physical education curricula for those with integration in our Egyptian schools.

ملخص البحث باللغة العربية

يهدف البحث إلى تحسين مستوى أداء القدرات الحركية باستخدام التقنيات المساندة لتلاميذ المعاقين حركياً بالطرف العلوى، استخدمت الباحثة المنهج التجريبي وذلك باستخدام التصميم التجريبي لمجموعة تجريبية واحدة بالقياس القبلي والبعدي لملائمته لطبيعة البحث، تم اختيار التلميذات المعاقين حركياً بالصف الأول الإعدادي بمدرسة إسباتس الخاصة كمجتمع كلى للبحث وعددهم (٢٦) تلميذة، وبعد الكشف المبدئي على التلميذات من ناحية القوام وسلامة أجزاء الجسم، تم اختيار عدد (١٦) تلميذة كمجموعة تجريبية من تلميذات المعاقين حركياً بالصف الأول الإعدادي بمدرسة إسباتس بالطريقة العمدية، كما تم اختيار عدد (١٠) تلميذة كمجموعة استطلاعية، بالفصل الدراسي الأول من العام الدراسي (٢٠٢٢/٢٠٢٣)، تم التوصل الى ان البرنامج المقترح له تأثير ايجابي على المستوى اداء التلميذات ذوى الاعاقات الطرف العلوى في كلا من:

- بعض القدرات الحركية
- قياسات المدى الحركى للطرف العلوى (الكتف - المرفق)
- الاختبارات المهارية (تمرير الكرة - دفع جلة)

توصى الباحثة باهتمام وزارة التربية والتعليم بالمعاقين حركياً في المدارس ، وإجراء المزيد من الدراسات عن استخدامات البرامج التأهيلية وتطبيقها في تعليم الأنشطة الرياضية المختلفة، وتطبيق التقنيات المساندة فى مناهج التربية الرياضية لذوى الدمج بمدارسنا المصرية.

The effect of using assistive technologies on improving motor abilities for students with disabilities in the upper limb

Research Introduction

The present era has witnessed interest in motor rehabilitation for people with special needs, motor rehabilitation is one of the basic natural means to restore the anatomical form and functional performance of the affected member using various motor therapeutic means in the shortest possible time, using training and exercises that are commensurate with the type and severity of the injury, and the motor rehabilitation process depends on the performance of physical exercises of various kinds in addition to the use and employment of devices and tools in order to complete the operations of Treatment and rehabilitation. (15:17)

Also, the assistive techniques used in the motor rehabilitation process such as the use of the EMS (Electrical Muscle Stimulation) device, which depends on the use of electrical waves to stimulate muscles through electrodes placed on the skin. Light electrical currents are sent to the nerves to stimulate muscle contractions similar to what happens during physical exercise, help improve muscle strength and restore function, and relieve chronic pain or arthritis, which contributes to an increase in the range of motion of the body joint. **(18:84) (27)**

Where the range of motion greatly affects the development and manifestation of various motor abilities, which include strength, speed, balance, compatibility, and endurance), and good range of motion allows the movements to be performed more efficiently and with better technology, which reduces the risk of injuries and improves performance, for example, in running, the range of motion of the joints (such as the hip and ankle) contributes to improving the length and speed of the step, the better the joint has a range of motion, the muscles associated with it can work more efficiently to generate strength, Dynamic stretches enhance range of motion, supporting strength in wide-motion exercises, and proper range of motion helps improve dynamic and static balance by enabling the body to maintain stable positions at greater angles of motion. **(8:29)**

The study of Alessandro P, at all **(2021)** aimed at the effect of the use of range neuromuscular electrical stimulation on fixed-load exercise and the subsequent recovery process and its results found that the application of post-exercise electrical stimulation led to improved recovery, and High lactate values, which may be due to the magnitude of muscle stress through both manual therapy and electrical stimulation compared to a control state in which the muscle received manual treatment only.

From the above, the importance of using assistive technologies in the motor rehabilitation of the physically handicapped, and assistive technologies can be used in the educational process in delivering information to students with disabilities in the different keys to understanding and ways to attract attention to each student, and since it is recognized that the attention cycle of people with disabilities is often short, some research has proven the effectiveness of augmented reality technology through assistive technologies with them.

Ahmed Abdel Fattah (2005) indicates that the goal of the educational process is to reach the learner's mastery of technical performance through saving effort, reducing errors and shortening

performance time, and this is achieved through the teacher's ability to clarify and explain the performance parts in appropriate ways that contribute to the formation and development of the learner's motor program, which results in the learner's positive participation and the performance of motor duties well until he reaches the mastery of performance. (1 :3)

This is what **Amin Al-Khouli, Diao Al-Din Al-Azab (2009) and Wafiq Salem (2003) stated** that the dependence of any educational system on educational technology is a necessity to ensure the success of these systems and an integral part of the structure of its system, and many educators try to take advantage of the broad and multiple possibilities offered by technology in order to develop the teaching and learning processes and raise the efficiency of performance. (4:38) (17:34)

The researcher concludes from the previous presentation that the introduction of assistive technologies to rehabilitate the physically handicapped to practice sports and facilitate the performance of motor abilities in addition to the use of assistive technologies in education can save traditional educational systems as they help to keep pace with scientific and technical developments and absorb modern technologies and continue their development, and compatibility with global changes and openness to international educational institutions and organizations and activate the role of agreements and joint programs with them in addition to that Modern technologies help to transfer information from the teacher to the learner whenever the technologies are appropriate, in addition to completing the learning process better, faster and with less effort, so there is an urgent need to use information and communication technology to support the process of good teaching and not a substitute for it.

Search problem

Walid Khalifa (2015) **points out** that disabled children are in dire need of continuous and continuous effort and comprehensive and integrated care from various educational and social institutions, in order to care for them to lead an effective and productive normal life.

Mohammed Sawalha (2015) indicates that the physically disabled face difficulties in learning skills from those in the same age group and have a delay in the ability to walk, and since these disabled people have more sensory and neurological problems than normal people, so it is expected that these children are less than normal in motor skills.

Through the researcher's experiences in the field of therapeutic motor rehabilitation and her previous experience as a physical education teacher, she finds that the use of augmented reality techniques is almost non-existent and does not occupy a percentage of the educational staff's use of assistive technology tools in the educational field in Egypt , as well as through the exploratory study carried out by the researcher by conducting an opinion poll through personal interviews with physical education teachers and asking them about the availability of assistive technologies in public schools and about the existence of a special curriculum for students with motor disabilities. In schools, these interviews resulted in the fact that public schools do not provide assistive technologies for the physically handicapped with integration into schools and the lack of a special curriculum for students with motor disabilities in government schools, and the researcher also noted the lack of use of assistive technologies (technological) in the education process, especially in the education of the physically handicapped.

After reviewing many studies, research and scientific references, studies and research conducted in the field of physical education in general, which were conducted in the field of teaching methods for the physically handicapped in particular, where many previous studies agreed that the disabled have a clear deficiency in major motor skills in general and fine motor skills in particular, **such as the study of Alessandro P, at all (2021), the study of Jafarpour (2015), the study of Aparicio & Balana (2009)**, hence caring for the disabled is a humanitarian necessity in order to help them become self-reliant in performing work that requires fine motor skills in order to become more independent and more compatible.

It also found deficiencies in the programs that are prepared to improve the motor abilities of children with motor disabilities and that the use of motor and rehabilitation activities in improving these skills with this category of disability did not receive sufficient attention in Arab studies and the deficiency in the motor abilities of children with motor disabilities is a clear problem for them, so the current study aims to improve motor skills in children with motor disabilities, The researcher noted the scarcity of producing special and advanced rehabilitation sports programs to teach the physically disabled and that this category needs special care, supportive techniques and studies based on scientific foundations that work to invest their energy and potential in the best ways to reach the best possible form of motor performance and find solutions and treatments for their motor problems and take their hands to achieve their wishes of practicing sports and even try to reach levels of representation in the Special Olympics and

integration In society, this prompted the researcher to carry out a study entitled **"The effect of using assistive technologies on improving the motor abilities of students with disabilities in the upper limb"**.

Research Objectives:

The research aims to improve the level of performance of motor abilities using assistive techniques for students with motor disabilities in the upper limb.

Research hypotheses:

- 1- There are statistically significant differences between the averages of the pre- and post-measurements in the motor abilities tests of the experimental research group with disabilities at the upper end in favor of the post-measurement.
- 2- There are statistically significant differences between the average of the pre- and post-measurements in the skill tests of the experimental research group with disabilities in the upper end in favor of the post-measurement.

Search terms:

Motor activities:

It is the physical or sports activity that the physically disabled person practices within a small group with the aim of achieving pleasure and happiness and improving motor and physical abilities through the games that they are accustomed to practicing in the physical education class. **(procedural)**

Motor abilities:

Werner et al. (2015) **stated** that they are the physical abilities that humans use in their motor and muscular activity in sitting, standing, walking, running, jumping, pushing, moving, disassembling and installation, and that people with motor disabilities face motor problems related to their ability to use their bodies. **(26:21)**

Physically handicapped students:

They are students who suffer from a condition of orthopedic disability, neurological or chronic rheumatic condition, bone deformities, muscular dystrophy, loss of a limb that limits their ability to use their bodies normally, which negatively affects their ability to participate in a physical education class or one of the school sports activities, and their age ranges between 12 and 15 years. **(procedural)**

Search Procedures

Research Methodology:

The researcher used the experimental method, using the experimental design of one experimental group by pre- and post-measurement to suit the nature of the research.

Research sample:

Basic research sample:

The physically disabled students in the first preparatory grade at **Espats** Private School were selected as a total research community, and their number is (26) students, and after the initial examination of the students in terms of strength and safety of body parts, (16) students were selected as an experimental group of students with motor disabilities in the first preparatory grade at Espats School in a deliberate way, and a number (10) A student as an exploratory group,

Time Range: First semester of the academic year (2022/2023).

Spatial Area: Spatiss School in Giza Governorate

Homogeneity of the research sample:

The researcher conducted homogeneity of the research sample by adjusting the research variables shown in Table (1)

Table (1)
Homogeneity of the research sample in the research variables
of the upper limb (injured party) before the experiment

n = 16

Variables	Lowest value	Highest value	Arithmetic mean	Deviation Normative	coefficient Convolution	Flattening coefficient
Age (years)	12.01	13.4	12.85	0.41	-0.40	-0.665
Total body length (cm)	150.5	154.3	152.45	1.47	0.06	-1.284
Weight (kg)	45.3	52.6	48.11	2.49	0.80	-0.391
Push a medical ball as far as possible	2.8	4.65	3.53	0.60	0.48	0.40
Ran30m from a moving start	11.6	7.4	9.54	1.49	0.20	-0.42
Running Zigzaji	9.8	5.1	7.71	1.62	-0.01	-0.54
Shoulder ArticulationTest	11.5	14.7	13.10	1.50	0.27	0.20
Shooting10 balls	33.7	26	27.75	3.93	1.34	0.57

Straight line walking test 20m	19.6	12.6	16.81	2.55	-0.38	-1.05
Pass the ball in 30 s	15.4	19.6	17.72	2.31	0.22	0.22
Shot put	3.1	4.8	4.25	0.82	0.90	0.91

It is clear from Table (1) that all the values of the torsion coefficients of the total research sample with disabilities at the upper end in the research variables are limited between ± 3 , which indicates the moderation and homogeneity of the members of the research sample.

Search Tools:

1- Appropriate skill tests for research:

The researcher identified some motor skills to be measured based on the physical education curriculum for the preparatory stage Attachment (6) for students of the first preparatory grade A number of (2) skill tests for students with disabilities with disabilities in the upper limb were determined as follows:

- Ball pass test at 30s
- Shot Put Test

Scientific transactions for skill tests (under research):

A- Honesty coefficient.

The researcher found the validity of skill tests by comparing the terminal between the upper and lower quarters to find the validity of the tests on 17/10/2022, as shown in Table (2).

Table (2)

The significance of the differences between the upper and lower quartiles to find the truthfulness of skill tests n=10

M	auditions	Top Quarters		Lower quarters		Average spreads	Value (v) Calculated
		Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation		
1	Pass the ball in 30 s	13.9	1.371	9.3	0.949	4.6	8.73*
2	Shot put	7.9	0.875	4.5	0.849	3.4	8.81*

Tabular value (T) at the level of 0.05 = 2.10 *

It is clear from Table (2) on the differences between the upper quarters and the lower quarters in the skill tests that there are statistically significant differences in the skill tests of handball and athletics skills,

where the value of (T) ranged between (8.73 – 8.81) and this value is significant at the level of (0.05), which indicates the sincerity of these skill tests.

B - Coefficient of stability.

Stability was found by reapplying the Test-Retest after (7) days and under the same conditions, from 17/10/2022 to 24/10/2022 as shown in Table (3).

Table (3)
Correlation coefficient between the first and second
application of the survey sample to find the stability of skill tests n=10

M	auditions	Unit of measurement	First application		Second application		Average spreads	Value (t)
			Q´	±	Q´	±		
1	Pass the ball in 30s	number	12.2	2.62	11.4	2.06	0.8	0.744
2	Shot put	meter	6.6	1.96	7	1.633	-0.4	0.870

Tabular value (T) at 0.05 = 2.10* Tabular value (t) at 0.05 = 0.468*

It is clear from Table (3) on the differences between the first and second applications in the skill tests of handball and athletics that the value of the correlation between the two applications in the test skill tests for handball and shot put ranged (0.744-0.870) which is a link that indicates the stability of these tests and thus the skills tests in their final form became valid for the research application.

2- Motor abilities (under research):

The researcher previously determined the motor abilities to be measured based on the physical education curriculum for the preparatory stage Annex (2) for students of the first grade of middle school was the preparation of a survey form for experts and included (9) abilities and the opinions of experts were as follows:

Table (4)
The percentage of expert agreement in determining
the appropriate motor abilities for research

n = 10

M	Motor abilities	Expert opinion				Reviews
		Agree	Ratio	Disagree	Ratio	
1	Muscular strength	3	30%	7	70%	Remove
2	bear	4	40%	6	60%	Remove
3	Characteristic Force Speed	10	100%	0	0%	
4	Speed	80	80%	2	20%	
5	Agility	80	80%	2	20%	
6	Respiratory Cycle Tolerance	3	30%	7	70%	Remove
7	Flexibility	10	100%	0	0%	
8	Compatibility	9	90%	1	10%	
9	homeostasis	80	80%	2	20%	

Table (4) of the expert opinion poll on the determination of motor abilities shows that the percentage of approval of experts ranged between (30%: 100%) and the researcher was satisfied with the percentage of (80%) to accept the tests, so the number of (6) motor abilities were selected.

Associated motor abilities tests under research:

The researcher conducted a reference survey of scientific references, including " " **Tayseer Mufleh Kawafha, Omar Fawaz Abdul Aziz (2005) , Mohamed Salama (2016), Islam Abdul Rahman (2021)** , Research and reference studies in the field of Sports Rehabilitation of which **Samia Khalil Mohammed (2004) , Farraj Abdel Hamid Tawfik (2005) , Medhat Abu Al , Nasr (2006)** , To determine Motor abilities (under research) A number of (6) capabilities were reached Kinetics (Speed Force for Arms, Speed Force for Legs, Transition Speed, Flexibility, Agility, CompatibilityhomeostasisTests were identified to be measured and presented to the experts, Annex (1) The number of (10) experts and those who expressed their opinions and a table (5) shows the percentage of expert agreement .

Table (5)
Percentage of expert agreement in motor abilities tests **n = 10**

M	Disability	Motor abilities	auditions	Expert opinion			
				I agree	Ratio	Disagree	Ratio
1	Upper limb	Speed characteristic force	Push a medical ball as far as possible	80	80%	2	20%
2		Transition speed	Ran 30m from a moving start	9	90%	1	10%
3		Agility	Running Zigzaji	10	100%	0	0%
4		Flexibility	Shoulder Articulation Test	80	80%	2	20%
5		Compatibility	Shooting 10 balls	9	90%	1	10%
6		homeostasis	Straight line walking test 20m	10	100%	0	0%

Table (5) of the expert opinion poll on motor abilities tests shows that the percentage of experts' approval ranged between (80%: 100%) and the researcher was satisfied with (80%) accepting the tests.

Scientific transactions of motor abilities tests under research:

The researcher found the scientific coefficients of motor abilities tests related to the skills under research in terms of honesty and stability on the research sample, which numbered (10) students from 17/10/2022 AD to 24/10/2022 as follows.

A- Honesty coefficient: The researcher calculated the validity of the tests using the terminal comparison method for the exploratory research sample and their number (10) students from the same research community and outside the basic sample, as shown in Table (6).

Table (6)
Authenticity of motor aptitude tests under consideration **n = (10)**

M	Capacity	auditions	Unit of measurement	Top Quarters		Lower quarters		Average spreads	Value (v) Calculated
				Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation		
Upper limb	Speed characteristic force	Push a medical ball as far as possible	meter	2.90	0.14	3.07	0.81	-0.17	0.51
	Transition speed	Ran 30m from a moving start	second	9.05	0.78	8.15	1.06	-0.90	1.62
	Agility	Running Zigzaji	second	7.1	0.57	6.05	1.34	-1.05	1.75
	Flexibility	Shoulder Articulation Test	poison	11.75	0.35	12.3	0.14	-0.55	1.08
	Compatibility	Shooting 10balls	number	25.5	0.71	26.8	4.74	-1.30	0.77
	homeostasis	Straight line walking test 20m	second	14.3	0.42	14.8	3.11	0.50	0.53

It is clear from Table (6) for the differences between the upper quartiles and the lower quartiles in the tests of motor abilities that there are statistically significant differences, where the value of (T) ranged between (0.16 to 1.77) and this value is significant at the level of (0.05), which indicates the sincerity of these tests

B - Coefficient of stability.

The researcher found the stability coefficient. The stability was found by re-applying the tests after (7) days and in the same conditions, from 17/10/2022 AD to 24/10/2022 AD as shown in Table (7).

Table (7)
Correlation coefficient between the first and second application
of the survey sample to find the stability of the tests motor abilities

n = (10)

M	Capacity	auditions	Unit of measurement	First application		Second application		Differences Average	Value (t)
				Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation		
Upper limb	Speed characteristic force	Push a medical ball as far as possible	meter	3.52	0.62	3.66	0.59	-0.14	0.493
	Transition speed	Ran30m from a moving start	second	9.71	1.34	9.53	1.24	0.18	0.960
	Agility	Running Zigzaji	second	7.74	1.67	7.83	1.71	-0.09	0.902
	Flexibility	Shoulder Articulation Test	poison	12.88	1.21	13.19	1.25	-0.32	0.987
	Compatibility	Shooting 10balls	number	28.25	3.45	27.53	3.12	0.72	0.769
	homeostasis	Straight line walking test20m	second	17.00	2.50	17.10	2.50	-0.09	0.744

It is clear from Table (7) on the differences between the first and second applications of motor abilities tests, that the value of the correlation between the two applications in the motor abilities tests ranges between (0.493 – 0.987), a correlation that indicates the stability of the motor abilities tests under study, **and thus the motor abilities tests in their final form became attached (10) valid for conducting research.**

Devices and tools used in research:

First: School Records:

The researcher extracted the data on the disabled students and calculated the age for the nearest month.

Second: Measuring Devices:

- Medical scale device to measure weight in kilograms.
- Rhythmiter measured length in centimeters.
- Stopwatch to calculate time.
- Tape measure for calculating distance in centimeters.

Second: Implementation Tools:

- Iron Shot Plate 1K: 3K.

- Handballs
- Cones
- Whistle
- Flags
- Scroll wall.
- rope

3.6 Proposed Program:

The researcher prepared a proposed program, and the researcher relied on preparing the programs on some of the following scientific foundations:

- The appropriate objective of the program is to improve the motor abilities crisis middle school students.
- The suitability of the program to the students' abilities and disabilities (research sample).
- Acceptance of the program for practical application
- The program should be commensurate with the age stage of the research sample.
- The capabilities and tools used in the program (under research) are available.
- The program should take into account security and safety factors.
- The program should help strengthen the spirit of cooperation and competition and encourage innovation.

In order to achieve the previous steps, it was necessary to follow the following steps:

Proposed motor therapy program:

The researcher prepared the proposed rehabilitation program using assistive technologies in an organized and clear manner according to the following steps:

I- Defining the general framework of the program:

The researcher relied on determining the general framework of the proposed rehabilitation program for a student with upper limb disability for two months using the electrical wave device (EMS) and physical exercises on three basic stages, and these stages are:

First: Planning Stage:

- ✓ This stage includes:

I- Determine the overall objective of the program.

- ❖ Determining the general goal is to rehabilitate students for a student with a disability in the upper limb using the electrical wave device (EMS)

II- Determine the type of education used in the implementation of the proposed program.

The researcher used the electrical wave device (EMS) and physical exercises for the experimental group.

III-Identify the supporting technologies used in the program:

The appropriate assistive technologies for the motor impairments under research have been identified, namely the "Visostim Ka-F38" device with a six-tone time setting of 5, 10, 15, 20, 25, 30 minutes.

IV-Determine the proposed content of the rehabilitation program most associated with upper limb disability:

The researcher reviewed the scientific references, including "Tayseer Mufleh Kawafha, Omar Fawaz Abdul Aziz (2005), Muhammad Salama (2016), Islam Abdul Rahman (2021), and research and reference studies in the field of sports rehabilitation, including" Marwan Abdul Majeed (2001), Samia Khalil Muhammad (2004), Farraj Abdul Hamid Tawfiq (2005), Medhat Abu Al-Nasr (2006), and the content of the program was determined as follows:

Warm up (5-10 minutes):

- Light walking or running.
- Simple stretching exercises.

Use the EMS (15-20) minutes, twice a week:

- Placing EMS electrodes on large muscles in a healthy arm.
- Placing EMS electrodes on the core muscles (abdomen, back).
- Operate the device according to the directions of the specialist.

Strength training (20-30 minutes, three times a week):

Upper body:

- Wall Push-ups using the proper arm.
- Lateral Raises with a healthy arm.
- Front Dumbbell Raises with a healthy arm.

Cardiorespiratory fitness (20-30 minutes, twice weekly):

- Brisk walking or running.
- Stationary bike rides.
- Swimming (if available).

Balance and flexibility exercises (10-15 minutes):

- Static stretching exercises.
- Balance exercises: standing on one leg, using a balance ball.

Calm down (5-10 minutes):

- Slow walking.
- Final stretching exercises.

V- Time plan for the proposed kinetic program

The researcher conducted an implementation of the proposed kinetic program on the day before the physical education class during the school activity session on (8) sessions for a period of (8) weeks for a period of 60: 90 s, and thus the program is ready for application.

VI-Teaching the experimental group using (educational program using assistive technologies):

The researcher implemented the content of the experimental group, where the application and implementation of the program are carried out, as follows:

- **5s warm-up performance**
- **10s Physical Preparation Exercises**
- **15 s educational activity (application of technical steps).**
- **10 s Applied activity (performance of applied exercises graded to develop skill performance and motor abilities.**
- **5 s Perform calming exercises at the end of the lesson.**
- **Note: The parameter acts as guidance, guidance and error correction.**

Exploratory Study:

The researcher conducted the exploratory study on a sample of (10) students from outside the basic sample and from the same research population on 17/10/2023 AD to 24/10/2023 AD.

Objective of the study:

- Conducting scientific transactions for physical tests.
- **Experimenting with the proposed program and applying two units to identify the difficulties that the researcher may face during the basic research experiment and to identify the suitability of the program and its suitability for students.**

The exploratory study resulted in:

- Ensure the validity of the tests under consideration.

- The suitability **of the proposed program** is in terms of scientific material, rehabilitation training and in terms of the age stage of the sample under research.
- An appropriate place for the application of basic study and know the difficulties and try to overcome them.

Basic study:

The researcher conducted the basic study on the experimental group as follows:

Pre-measurements:

After completing the preparation of the research tools, the researcher conducted the pre-measurements in the variables (age - height - weight - motor abilities tests - skill tests) on 14/11/2022 AD.

Implementation of the basic study:

The basic study was applied to the experimental research group from 18/11/2022 AD to Tuesday 23/12/2022, and the researcher took into account when implementing and applying the unit (one for each of the motor disabilities (upper limb) and also equality in the time of the unit and one and the time of rehabilitation training, with the aim of adjusting the time variable, taking into account that the place of implementation is in order to adjust the place variable.

Dimensional measurements:

After completing the application of the basic experiment, the dimensional measurements of the experimental group were carried out in variables (motor abilities tests - skill tests) on 12/27/2022 AD, under the same conditions as the pre-measurement.

Statistical treatments.

After collecting data and recording the different measurements of the variables used in this research, the statistical program SPSS was used to perform the following statistical treatments:

Mean.	. Arithmetic mean
Median.	. Broker
Standard Deviation.	. Standard deviation
Skewness.	. Torsion coefficient
Paired Samples T Test.	Test the significance of differences (T)
Correlation (person).	Simple correlation coefficient (Pearson)
Percentage of Progress.	.Improvement rates

Presentation and discussion of results

After conducting the basic study on the research sample in the specified period, and after limiting the degrees of pre- and post-measurements, the researcher conducted the necessary statistical transactions and achieved the following results too:

Presentation and discussion of the results of the first hypothesis:

Which states that "there are statistically significant differences between the averages of the pre- and post-measurements in the motor abilities tests of the experimental research group with disability at the upper end in favor of the post-measurement”?

In orderto verify the validity of the hypothesis, scientific transactions were conducted between the pre- and post-measurement in the motor abilities tests, and the results were as follows:

Table (8)
Significance of the differences between the averages of the pre- and post-measurements of the group ExperimentalUpper Limb Disability in Motor Aptitude Tests (Research)

(16= ن)

M	Capacity	auditions	Unit of measurement	Pre-measurement		Telemetry		Average spreads	value t	Percentage improvement
				Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation			
1	Speed characteristic force	Push a medical ball as far as possible	meter	3.53	0.60	4.32	0.65	0.79	3.59	22.46%
2	Transition speed	Ran30m from a moving start	second	9.54	1.49	7.58	1.02	-1.96	-4.27	20.55%
3	Agility	Running Zigzaji	second	7.71	1.62	6.20	1.18	-1.50	-2.97	19.55%
4	Flexibility	Shoulder Articulation Test	poison	13.10	1.50	16.08	1.88	2.97	4.97	22.70%
5	Compatibility	Shooting10 balls	number	27.75	3.93	29.64	3.26	8.10	6.30	29.20%
6	homeostasis	Straight line walking test 20m	second	16.81	2.55	13.37	2.24	-3.45	-4.04	20.50%

It is clear from **Table (8)** and **Figure (1)** that there are statistically significant differences at the level of (0.05) between the dimensional and pre-measurement in the tests of motor abilities of the students of the first preparatory grade in the experimental group with disabilities at the upper

end and in favor of the dimensional measurement where the value of "T" calculated (2.97: 6.30), which is greater than the value of "T" tabular The improvement rates ranged between (19.55%: 29.20%), so the compatibility obtained the highest percentage of improvement, followed by the distinctive power with speed.

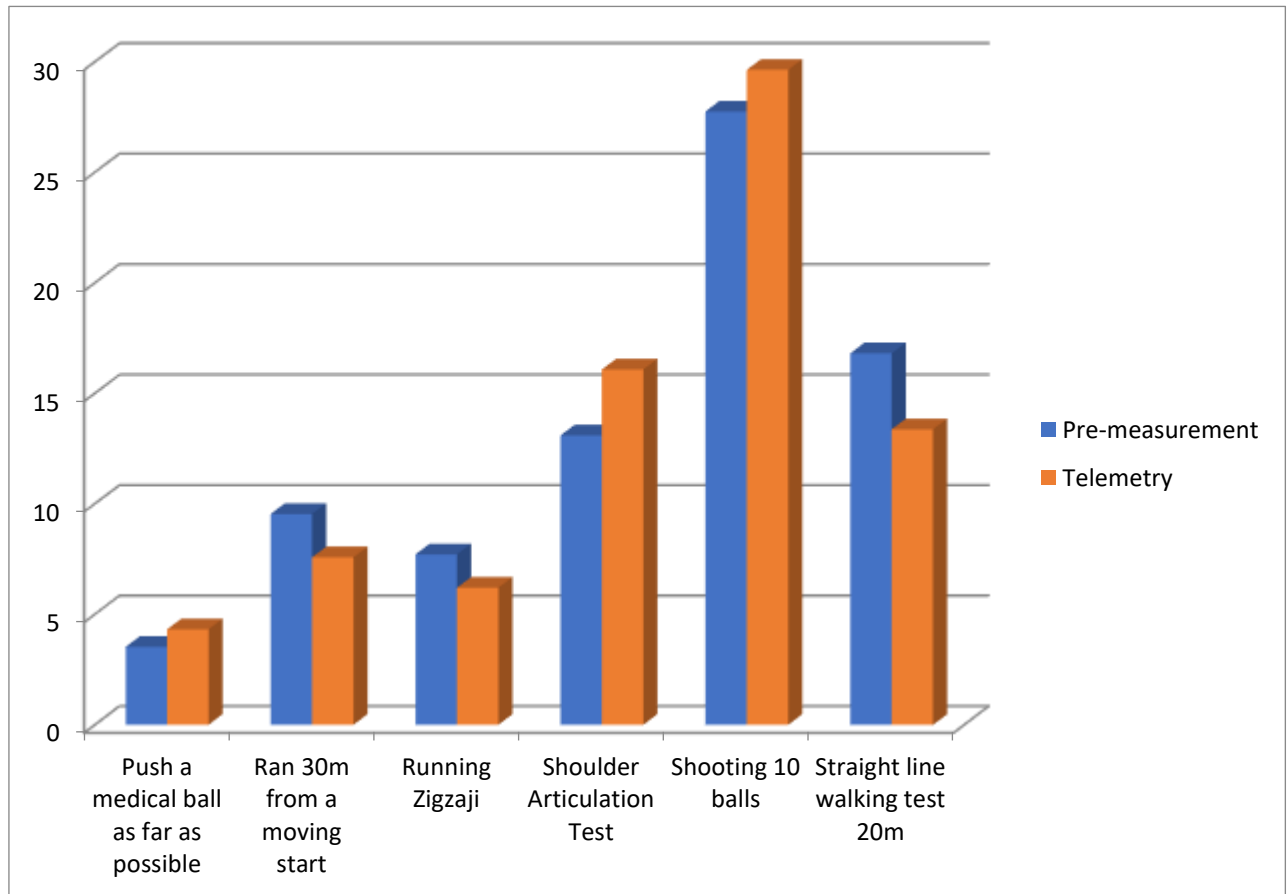


Figure (1)
Significance of the differences between the averages of the pre- and post-measurements of the group ExperimentalUpper Limb Disability in Motor Aptitude Tests (Research)

It is clear from the results of Table (8) that the experimental group with upper limb disability improved in the motor abilities tests, where the improvement rates ranged between (9.86%: 23.72%), so the strength characteristic of speed obtained the highest percentage of improvement, followed by balance.

The researcher attributes this result to the fact that the rehabilitation process helped the students to reorganize its internal structure by accepting reality and dealing with it only, and expanded the circle of attention and modified the environment that the student deals with to achieve the balance

or compatibility required in performance, which led to the student's desire to perform the therapeutic program, in addition to the use of **the EMS device (Electrical Muscle Stimulation)**, which led to Muscle stimulation similar to what happens during physical exercise improves muscle strength and resilience and helps relieve pain or arthritis.

In this regard, **Devahi, J (2000)** pointed out that rehabilitation is the process of restoring fitness and ability to perform, and to make the individual fit (physically) while restoring his abilities and capabilities that were before the injury. (24:99)

Abdullah bin **Abdulaziz Al-Mousa (2008)** also pointed out the importance of academic rehabilitation in facilitating the delivery and explanation of information to students with special needs and helping to raise their academic level. 9:46)

This is consistent with what **Samia Khalil (2004)** pointed out that rehabilitation programs use all special procedures, means and measures taken during training or competitions for the purpose of preventing or reducing the occurrence of injury and reducing associated complications in the event of its occurrence. (7:34)

The researcher also believes that the treatment program contains rehabilitation exercises designed to improve motor abilities, and these exercises focus on strengthening the muscles of the injured limb, supporting joints and restoring stability, using light weights, resistance to rubber cords, balance ball, which contributed to enhancing motor abilities.

This is consistent with what was pointed out by **both Qasim Lazam (2005) and Osama Riad (2000)** that the physical aspect is the development of special motor abilities, the acquisition of motor skills, the activation of the nervous system, the reduction of dictionary deviations and the development of physical fitness to rely on itself and face life. (12:90) (2:19)

This is consistent with the findings of the study "**Ahmet Sirinkan (2016)**, where there was a development in balance after the application of the kinetic education program to the Pilates method in developing flexibility and balance in children, and the study of **Zainab Alwani. 2018)**, which found that disabled people engaged in motor activities had a higher level of functional abilities than non-exercisers.

Through the previous presentation, the validity of the first hypothesis is verified, which states that "there are statistically significant differences between the averages of the pre- and post-measurements in the motor abilities tests of the experimental research group with disabilities at the upper end in favor of the post-measurement."

Presentation and discussion of the results of the second hypothesis:

Which states that "there are statistically significant differences between the averages of the pre- and post-measurements in the skill tests of the experimental research group with disabilities at the upper end in favor of the post-measurement"?

In order to verify the validity of the hypothesis, scientific transactions were conducted between the pre- and post-measurement in the skill tests, and the results were as follows:

Table (9)
Significance of the differences between the averages of the pre- and post-measurements of the group Experimental with upper limb disability in skill tests (under research)

(16= ن)

M	Skill	auditions	Unit of measurement	Pre-measurement		Telemetry		Average spreads	value t	Percentage improvement
				Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation			
1	handball	Pass the ball in 30s	number	17.72	2.31	23.06	2.36	5.34	6.46	30.13%
2	Shot put	Shot put	meter	4.25	0.82	5.75	1.04	1.50	4.56	35.38%

It is clear from Table (9) and Figure (2) that there are statistically significant differences at the level of (0.05) between the post-measurement and pre-measurement of the experimental group with disabilities in the upper end in the skill tests (under research) and in favor of the post-measurement, where the calculated value of "T" ranged (4.56: 6.46), which is greater than the tabular value of "T" and an improvement rate ranging between (30.13%: 35.38%).

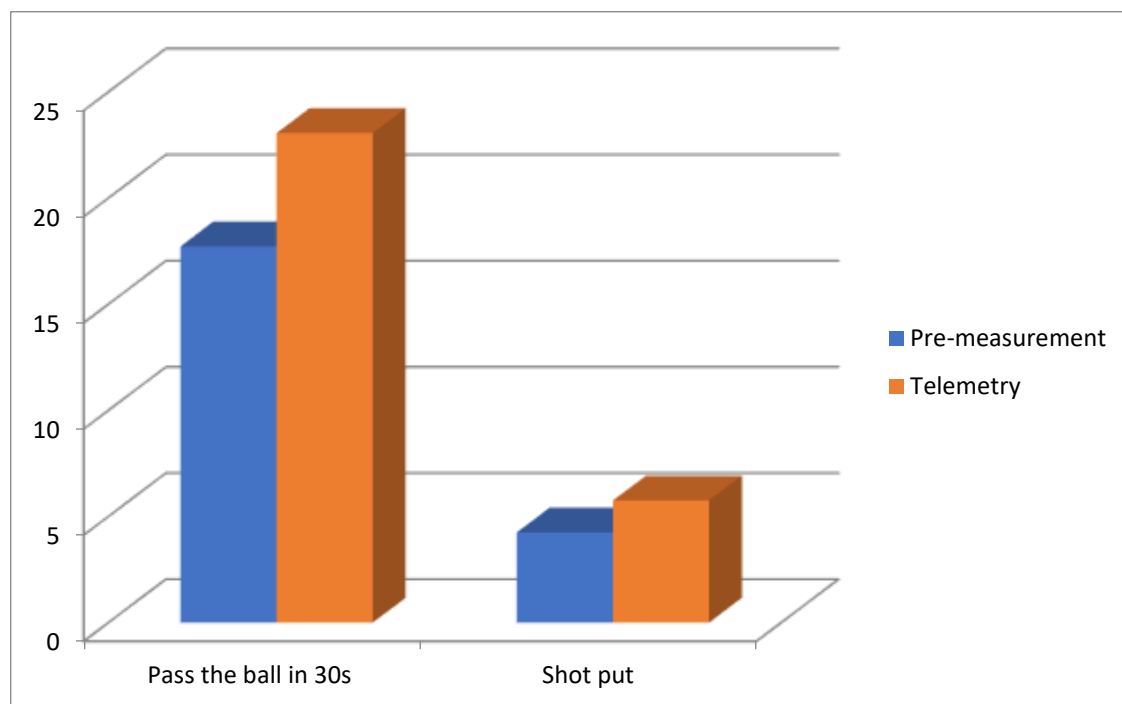


Figure (2)

Significance of the differences between the averages of the pre- and post-measurements of the group Experimental with upper limb disability in skill tests (under research)

It is clear from Table (9) and Figure (2) that the experimental group with disability in the upper limb improved in the skill tests (under research) with an improvement ranging between (30.13%: 35.38%).

The researcher attributes this result to the impact of assistive technologies and motor rehabilitation processes that contributed to the development of motor abilities, which led to the development of the skill side, and this is what Baha **Qasim Lazam (2005) pointed** out that motor ability is an indication of the efficiency of performance of basic motor skills and skills associated with sports activity **with (12: 90)**

This is consistent with what Osama **Riad (2000) pointed** out that the physical aspect of the development of special motor abilities helped in the acquisition of motor skills, activate the nervous system and reduce dictionary deviations, which provided opportunities for students to perform the skills under research.(2:19)

This is consistent with the findings of the studies of **Ahmet Sirinkan (2016), Issa Brahimi, Sabreen Issa, Nasreddin Combat (2018), and the study of Zainab Alwani. 2018)** that assistive technologies have a positive impact on improving motor abilities and skill performance.

Through the previous presentation, the validity of the second hypothesis is verified, **which states that** "there are statistically significant differences between the averages of the pre- and post-measurements in the skill tests of the experimental research group with disabilities at the upper end in favor of the post-measurement."

Conclusions and recommendations

Conclusions: In light of the results of the current study, the following conclusions were reached:

1. The proposed program has a positive impact on the level of performance of students with upper limb disabilities in:
 - Some motor abilities
 - Measurements of the range of motion of the upper limb (shoulder – elbow)
 - Skill tests (passing the ball - pushing a shot)

Recommendations: In light of the conclusions of the study, the researcher recommends the following:

1. The Ministry of Education's interest in the physically handicapped in schools.
2. Conducting more studies on the uses of rehabilitation programs and their application in teaching various sports activities.
3. Applying assistive technologies in the physical education curricula for those with integration in our Egyptian schools.

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