

Effect of an Educational Sports Program on Motor Skill Development in Primary School Pupils

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Abstract:

The current study aims to investigate the impact of an educational sports program on improving motor skills in primary school pupils. The researchers employed an experimental approach suitable for the research topic, with a sample of 20 pupils aged 7-8 years (male), who were purposefully selected from Ziani Miloud Primary School in Oran. The sample was divided into an experimental group and a control group, each consisting of 10 pupils. The researchers used various motor skill tests, including balance and reaction time tests, along with a set of educational units based on the applied program schedule. For data collection and statistical analysis, the team relied on mean, standard deviation, "t" test, and Pearson's correlation coefficient for statistical treatment of the results. The research team concluded that there were statistically significant differences between the control and experimental groups in motor skills, favoring the experimental group in balance and reaction time.

Keywords: Sports Program; Motor Skills; Primary School.

1. Introduction:

The implementation and regular practice of sports activities are among the essential components of the educational structure. These activities aim to teach and engage children, fostering the development of their physical and cognitive aspects by diversifying applications within their programs. These applications are grounded in rich and varied scientific fields that expand usage across all types based on well-balanced standards and indicators.

Most sports activities attract children due to their physical and mental benefits. They contribute to developing physical, motor, mental, and cognitive aspects alike (Sharaf, 2015, p. 79). Sharaf believes that engaging in sports regularly offers multiple benefits, including physical and cognitive advantages, unlike other unstructured and unmonitored activities (Jabbar Abdessalam, 2014, p. 67). He argues that sports programs possess clear standards that influence the improvement process, facilitating consistency in the practical aspects of such activities.

Life's demands for motor and social skills require children to adapt to daily situations. Sports activities are essential in developing children's performance through various movements and skills, including fundamental motor skills like balance and coordination—both of which are crucial for children in their everyday tasks. This is reflected in the impact of field monitoring of regular practice, based on program unit standardization (Abdullah, 2005, p. 359). A child's ability to

overcome challenges during practice is evident in their problem-solving capabilities, quick integration of the nervous and motor systems, and high levels of coordination. These contribute to the elegance and speed of execution. Most movements rely on balance, coordination, and reaction speed, resulting in efficient performance in minimal time and effort (Asaad Hussein, 2009, p. 106).

Therefore, the importance of this study lies in highlighting the impact of an educational sports program on improving certain motor abilities among primary school students.

1.1. Research Problem:

Primary school children are known for their high activity levels and dynamic interaction with engaging stimuli. However, their movements often lack structure and regularity. This study, grounded in educational sports expertise, seeks to implement a structured sports education program based on walking, running, and play exercises. The objective is to regulate movement rhythm, monitor practical application, and foster repeated discipline targeting fundamental motor abilities.

Fundamental motor abilities positively influence performance. Balance, for example, plays a critical role in maintaining proper alignment during movement and stillness (Oueinati, 2020). Motor coordination is equally essential for sequencing movements across limbs and muscle groups, enabling simple or complex movements. Reaction speed, on the other hand, helps avoid movement-related issues and collisions, allowing children to reach high performance levels in less time. Accordingly, the main research question is:

Does the educational sports program impact the improvement of certain motor abilities among primary school pupils?

1.2. General Hypothesis:

- The educational sports program has an effect on improving certain motor abilities among primary school pupils.

1.2.1. Specific Hypotheses:

- There are no statistically significant differences between pre- and post-tests in the control group regarding balance and reaction speed.
- There are statistically significant differences between pre- and post-tests in the experimental group regarding balance and reaction speed, in favor of the post-test.
- There are statistically significant differences in the post-tests between the experimental and control groups regarding balance and reaction speed, in favor of the experimental group.

1.3. Research Objectives:

- To identify students' levels in certain motor abilities.
- To focus on the role of educational sports programs in developing and improving various aspects of primary school students.
- To determine the differences between students engaged in structured sports activities and those in unstructured programs.

1.4. Research Significance:

- Promoting educational sports programs for children from an early age.

- Providing scientific value on the necessity of regular follow-up in implementing sports education programs and their impact on students' physical and mental development.
- Emphasizing the vital importance of educational sports activities for primary school children.
- Enabling academics to continue research in areas related to children's physical and mental development through various sports education programs.

1.5. Key Terms:

Educational Sports Program: A set of sessions and educational units consisting of purposeful exercises and sports activities targeting specific motor and muscular groups, balanced in time, intensity, and performance (Al-Saffar, 2009).

Motor Abilities: A set of attributes enabling the body to perform various simple and complex movements effectively. These include balance, coordination, and reaction speed (Kheiriya, 2005).

Primary Education Stage: Covers childhood years from ages 6 to 11. This stage involves significant physiological, psychological, and mental changes and is often considered the end of childhood, as the child transitions into adolescence (Zaid, 2010).

1.6. Previous and Similar Studies:

- **Study by Nouredine Kouadri (2018):** Title: The Contribution of Motor Education in Developing Certain Coordination Abilities in the Preparatory Stage Objective: To highlight the contribution of motor education in developing coordination abilities in children. Method: Experimental approach. Sample: 40 children from the preparatory stage. Tools: Tests measuring coordination abilities, balance, agility, and motor response speed. Key Findings: Motor education activities contributed to improving certain coordination abilities in children.
- **Study by Laghroue Abdelhamid (2019):** Title: The Impact of Movement Games in Improving Certain Non-Locomotor Motor Skills among First Grade Elementary Pupils Objective: To identify the impact of movement games on non-locomotor motor skills. Method: Experimental approach. Sample: 33 boys and girls, randomly selected. Tools: Tests for static and dynamic balance, Pearson correlation coefficient, Student's t-test, pie chart, mean, and standard deviation. Key Findings: Statistically significant differences were found in both static and dynamic balance tests, indicating an improvement in non-locomotor motor skills.
- **Study by Ait Lounis Mourad (2018):** Title: The Impact of a Motor Education Program on Developing Basic Motor Skills and Motor Abilities in Fourth Grade Primary Pupils (Ages 9–10) Objective: To assess the impact of a motor education program on developing basic motor skills and abilities. Method: Experimental approach. Sample: 26 children. Tools: Life skills scale, mean, Pearson correlation coefficient, t-test, standard deviation. Key Findings: The program had a positive impact on developing basic motor skills and abilities.
- **Study by Djamel Mokrani and Ibrahim Ousnoussi (2022):** Title: Proposed Educational Units Using Guided Play to Improve Certain Coordination Abilities in Primary Stage Pupils (Ages 9–12) Objective: To determine the impact of guided play-based educational units on improving coordination abilities. Method: Experimental approach. Sample: 26 pupils

divided into a control group (13) and an experimental group (13). Tools: Designed educational units, applied and assessed using means, standard deviations, t-tests, and ANOVA. Key Findings: Coordination abilities improved through the use of guided play and applied educational units.

Main Findings: The researcher found that coordinative abilities improved among students through guided play and the implemented units.

2. Research Methodology and Tools:

2.1 Research Methodology:

The research methodology represents a fundamental stage in the scientific research process. The nature of our study necessitated the use of the experimental method, which Professor Ahmed defined as: “An attempt to control all fundamental factors affecting the dependent variable(s) in an experiment, except for one factor that the researcher manipulates in a specific way to measure its impact on the dependent variable(s).” (Attallah Ahmed, 2009, p.137)

2.2 Research Population and Sample:

The research population consisted of third-grade male students from Ziani Miloud Primary School, totaling 72 students. We adopted a random sampling method, defined as: “Providing equal opportunities for each individual in the population to be selected, forming a representative sample.” (Ibrahim, 2006, p.95). The research sample included 20 male students, accounting for 27.77% of the study population, divided equally into an experimental group (10 students) and a control group (10 students), aged between 7 and 8 years.

2.3 Research Fields:

- **Location:** Ziani Miloud Primary School, Bir El Djir District – Oran
- **Timeframe:** From November 4, 2024 to February 6, 2025
- **Participants:** Third-grade male primary school students

2.4 Research Variables:

- **Independent Variable:** The sports educational program designed by the researcher.
- **Dependent Variable:** Motor abilities, influenced by the independent variable.

2.5 Research Tools:

- **Motor Ability Tests:**
 - **Balance Test (Heel-to-Toe Walk):**
 - **Purpose:** To measure students’ balance.
 - **Tools:** Stopwatch, measuring tape, cones.
 - **Procedure:** A 6-meter path is marked using cones. The student starts at the first cone and walks heel-to-toe toward the second cone, ensuring the toes of the back foot touch the heel of the front foot throughout. Time is recorded.
 - **Nelson’s Reaction Time Test:**
 - **Purpose:** To measure the student’s reaction speed.

- **Tools:** A 20m x 2m open space, measuring tape, stopwatch.
- **Procedure:** The student stands at one end of a midline. The tester stands at the other end holding a stopwatch and gives a direction (left or right) by quickly moving their arm, simultaneously starting the timer. The student runs in the indicated direction for 6.4 meters and stops the timer.
- **Recording:** The best time from three attempts on each side (left and right) is recorded.
- **Program Content:** A series of sports educational units designed for students, taking into account:
 - Ensuring safety during implementation
 - Suitability to students' physical abilities
 - Appropriateness to students' cognitive levels

Program Phases:

- **Preparatory Phase:** Focused on mental and physical readiness (motivation, simplification of exercises, encouragement, general and specific warm-up), lasting 8 minutes.
- **Main Phase:** Included educational exercises targeting balance and reaction speed (e.g., running to marked lines, changing direction, timed competitive play), lasting 20–26 minutes.
- **Concluding Phase:** Involved relaxation, return to calm, student encouragement, and motivational reinforcement, lasting 4–6 minutes.

2.6 Research Procedures:

- **Program Implementation:** The sample was divided into two groups. The experimental group participated in the sports educational program while the control group did not. The program lasted 7 weeks, with 14 sessions (2 sessions per week).
- **Pre-tests:** Conducted on November 11, 2024, for both groups to measure motor abilities.
- **Post-tests:** Conducted on February 2, 2025, after implementing the program.

2.7 Pilot Study:

After finalizing preparatory steps, a pilot study was conducted at Ziani Miloud Primary School to define the research population and sample. Motor ability tests (balance, coordination, reaction speed) were applied to 6 students, who were later excluded from the main study. The tests were repeated under the same conditions after 6 days to confirm result reliability.

2.8 Scientific Basis for Research Tools:

- **2.8.1 Expert Validity:**

The motor ability tests were reviewed by expert teachers from October 11 to October 15, 2024. Experts evaluated the tests based on applicability, ease, progression, and suggested necessary adjustments. The evaluation achieved a 100% acceptance rate.

- **2.8.2 Test Reliability:**

The tests were applied and reapplied after 6 days under identical conditions to the 6 students excluded from the main study. Using Pearson's correlation coefficient and a significance level of 0.05 (df = 4), the reliability of the tests was confirmed.

Table (1): Shows the reliability coefficient, skewness, and intrinsic validity of the test results. Statistical Indicators for Tests:

Test	Sample Size	Degrees of Freedom (n-2)	Statistical Significance Level	Test Reliability Coefficient	Test Validity Coefficient	Skewness Coefficient	Type of Significance
Balance Test	06	04	0.05	0.87	0.93	0.39	Significant
Reaction Time Test				0.89	0.94	0.34	Significant

Based on the table above, the statistical significance of the applied tests becomes evident, as the calculated reliability coefficient values for the balance test and the reaction time test were 0.87 and 0.89 respectively, at the significance level of 0.05 and degree of freedom 4. In addition, the skewness coefficient values were within the acceptable range between -1 and +1, indicating normal distribution, high reliability, and strong validity of the applied tests.

2-8-3. Statistical Tools Used:

- Arithmetic Mean
- Standard Deviation
- Pearson Correlation Coefficient
- Student's t-test

3. Results and Discussion:

3.1. Presentation and Analysis of Results:

3.1.1. Results of the Pre-Test for Both Groups:

Table (02) shows a comparison of pre-test results between the control group and the experimental group in the balance test and Nelson reaction time test.

Statistical Significance at 0.05 Level:

Test	Table "T" Value	Calculated "T" Value	Control Group (Mean ± SD)	Experimental Group (Mean ± SD)	Statistical Indicators
Balance	1.78	1.09	Mean = 0.2, SD = 1.89	Mean = 0.18, SD = 1.87	Not Significant

Nelson Reaction Time	1.78	0.62	Mean = 0.06, SD = 0.13	Mean = 0.08, SD = 0.14	Not Significant
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Analysis of Results:

From the above table comparing the pre-test results between the control and experimental groups, we observe the following:

- For the balance test, the experimental group had a mean of 1.87 and a standard deviation of 0.18, whereas the control group had a mean of 1.89 and a standard deviation of 0.06. The calculated t-value was 1.09 with a degree of freedom of 18, which is less than the tabulated t-value of 1.78 at a 0.05 level of significance. This indicates that there is no statistically significant difference between the two groups in the balance test during the pre-test phase.
- For the Nelson reaction time test, the experimental group had a mean of 0.14 and a standard deviation of 0.08, while the control group had a mean of 0.13 and a standard deviation of 0.06. The calculated t-value was 0.62 at 18 degrees of freedom, which is also less than the tabulated t-value of 1.78, indicating no statistically significant difference between the groups in reaction time during the pre-test.

Conclusion:

Both groups are equivalent in their levels of balance and reaction time, which is evident from the similar characteristics and performance levels of both the control and experimental groups in the pre-test phase. This reflects a homogeneous starting point for both groups.

3.1.2. Presentation and Analysis of Pre- and Post-Test Results of the Control Group:

Table (3) shows a comparison of pre- and post-test results for the balance ability in the control group.

Test	Significance Type	Significance Level	Table "T" Value	Calculated "T" Value	Standard Deviation	Mean	Degrees of Freedom	Statistical Indicators
Balance Test	Not Significant	0.05	1.13	0.86	0.2	1.89	09	Pre-Test
	Not Significant	0.05	1.13	0.21	1.90			Post-Test

Analysis of Results:

In the pre-test, the control group scored a mean of 1.89 with a standard deviation of 0.20. In the post-test, the mean was 1.90 and the standard deviation was 0.21. The calculated t-value was 0.86 at a degree of freedom of 9, which is less than the tabulated t-value of 1.13 at a significance

level of 0.05. This indicates that there is no statistically significant difference between the pre- and post-test results of the control group in terms of balance ability.

Table (4) shows a comparison between pre- and post-test results of the **reaction time** in the control group.

Test	Significance Type	Significance Level	Table "T" Value	Calculated "T" Value	Standard Deviation	Mean	Degrees of Freedom	Statistical Indicators
Nelson Reaction Time Test	Not Significant	0.05	1.13	1.04	0.06	0.13	09	Pre-Test
	Not Significant	0.05	1.13	0.05	0.12			Post-Test

3-1-3. Presentation and Analysis of Pre- and Post-Test Results of the Experimental Group:

Table (5) presents a comparison between the pre- and post-test results of the experimental group in balance ability.

Test	Significance Type	Significance Level	Table "T" Value	Calculated "T" Value	Standard Deviation	Mean	Degrees of Freedom	Statistical Indicators
Balance Test	Significant	0.05	1.13	4.81	0.18	1.87	09	Pre-Test
	Significant	0.05	1.13	2.18	0.22			Post-Test

Analysis of Results:

In the pre-test, the mean was 1.87 with a standard deviation of 0.18; in the post-test, the mean increased to 2.18 with a standard deviation of 0.22. The calculated t-value was 4.81 with 9 degrees of freedom, which is greater than the tabulated t-value of 1.13 at the 0.05 level of significance. This indicates a statistically significant difference in favor of the post-test in the balance ability of students in the experimental group.

Table (6) presents a comparison between pre- and post-test results of the experimental group in reaction time.

Test	Significance Type	Significance Level	Table "T" Value	Calculated "T" Value	Standard Deviation	Mean	Degrees of Freedom	Statistical Indicators
Nelson Reaction Time	Significant	0.05	1.13	7.41	0.08	0.14	09	Pre-Test

Test								
	Significant	0.05	1.13	0.10				Post-Test

Analysis of Results:

In the pre-test, the mean was 0.14 and the standard deviation was 0.08; in the post-test, the mean improved to 0.10 with a standard deviation of 0.05. The calculated t-value was 7.41 at 9 degrees of freedom, which is greater than the tabulated t-value of 1.13, indicating a statistically significant difference between the two tests in favor of the post-test.

Conclusion:

The results from Tables (5) and (6) show that there are statistically significant differences between the pre- and post-tests for the experimental group, both in balance ability and reaction time.

A3-1-4. Post-Test Comparison Between the Control and Experimental Groups:

Table (7) presents a comparison of the post-test results between the control and experimental groups in balance ability.

Test	Significance Type	Table Value	"T" Calculated "T" Value	Control Group (Mean ± SD)	Experimental Group (Mean ± SD)	Statistical Indicators
Balance Test	Significant	1.78	3.61	1.90 ± 0.21	2.18 ± 0.22	

Analysis of Results:

The experimental group had a mean of 2.18 and a standard deviation of 0.22, while the control group scored a mean of 1.90 and a standard deviation of 0.21. The calculated t-value was 3.61 at 18 degrees of freedom, which is greater than the tabulated t-value of 1.78 at the 0.05 significance level. This indicates the presence of statistically significant differences between the two groups in balance ability in favor of the experimental group.

Table (8) presents a comparison of reaction time post-test results between the control and experimental groups.

Test	Significance Type	Table Value	"T" Calculated "T" Value	Control Group (Mean ± SD)	Experimental Group (Mean ± SD)	Statistical Indicators
Nelson Reaction Time	Significant	1.78	2.99	0.12 ± 0.05	0.10 ± 0.05	

Analysis of Results:

The experimental group had a mean of 0.10 and a standard deviation of 0.05, while the control group scored a mean of 0.12 with the same standard deviation (0.05). The calculated t-value was 2.99, which is greater than the tabulated t-value of 2.09 at 18 degrees of freedom and a significance level of 0.05. This confirms a statistically significant difference in favor of the experimental group in reaction time.

Conclusion:

The findings from Tables (7) and (8) show statistically significant differences between the control and experimental groups in the post-test results of both balance ability and reaction time, in favor of the experimental group.

3-2. Discussion of Results in Relation to Hypotheses:

3-2-1. Discussion of Control Group Results:

Based on the findings in Tables (3) and (4), no statistically significant differences were observed between the pre- and post-tests in either balance or reaction time for the control group. This suggests that there was no improvement in the students' abilities, which can be attributed to the absence of the implemented educational sports program. The t-values for both tests were 0.86 (balance) and 1.04 (reaction time), which are below the tabulated t-value of 1.13 at a degree of freedom of 9 and a significance level of 0.05

This suggests that without exposure to structured or unstructured physical effort targeting motor skills, students tend to maintain a low or baseline level of motor performance. These findings are consistent with the results of Francesca Piacentini's 2016 study, which found that children's motor skills do not significantly improve in school settings without regular practice of targeted physical activities (Piacentini, 2016).

Conclusion:

The first hypothesis is confirmed: *There are no statistically significant differences between the pre- and post-test results of the control group in balance and reaction time.*

3-2-2. Discussion of Experimental Group Results:

From Tables (5) and (6), statistically significant differences were observed between the pre- and post-test results in both balance and reaction time for the experimental group. The t-values were 4.81 for balance and 7.41 for reaction time, both exceeding the tabulated value of 1.13 at the 0.05 significance level.

These findings confirm an improvement in motor performance as a result of implementing the educational sports program, which focused on concentration exercises and neuromuscular coordination. This aligns with the findings of Jamal Mokrani (2022), who highlighted that improving coordinative abilities in children requires well-structured teaching units, and Laghrour Abdelhamid (2019), who showed that motor games help develop static balance and other non-locomotor motor skills. Similarly, Claude Guy (2014) emphasized that coordinative abilities in

children vary according to the type of educational activity applied. The results are also consistent with Maria Passontini's 2016 study, which demonstrated that motor skills can develop significantly in preschool children through structured programs. Children aged 7 to 8 years old thus show high potential for motor skill improvement through regular, targeted educational sports programs.

Conclusion:

The **second hypothesis is confirmed**: There are statistically significant differences between the pre- and post-test results of the experimental group in favor of the post-test in both balance and reaction time.

3-2-3 Discussion of Results Between the Experimental and Control Groups in the Post-Test:

Based on the results presented in Tables (7) and (8), we observed significant differences between the experimental and control groups in the post-test for both balance and reaction time, favoring the experimental group. This can be attributed to the implementation of the educational sports program for the experimental group, while the control group did not receive any such program.

In the post-test for balance, the calculated t-value for the two groups was 3.61, which is greater than the critical t-value of 1.78 at 18 degrees of freedom and a significance level of 0.05. This indicates a significant difference in favor of the experimental group, which had a higher mean score in the balance test. Similarly, in the reaction time Nelson test, the t-value was 2.99, which is greater than the critical t-value of 1.78 at 18 degrees of freedom and a significance level of 0.05, again indicating a significant difference in favor of the experimental group, which had a higher mean score.

Thus, the effectiveness of the educational sports program was evident in improving both balance and reaction time for the experimental group. This finding is consistent with the results of studies such as that by Abdelfattah Qadri (2015), which showed that small games-based programs contribute to improving reaction time and transition speed in middle school students. Likewise, the research by Daghnouch okba (2021) showed that motor programs enhance physical qualities in children with minor disabilities, improving both balance and coordination.

Therefore, it can be concluded that the educational sports program had a positive impact on the experimental group's balance and reaction time, which supports the hypothesis that there are statistically significant differences in the post-test results between the experimental and control groups, favoring the experimental group.

4- Conclusion:

Based on the results of the study, which focused on applying an educational sports program to improve motor skills such as balance and reaction time in primary school students, we found improvements in the level of balance and reaction time in the experimental group. This was achieved through the units that comprised the program, which included specific exercises and sports formations.

The study concluded that there were statistically significant differences between the experimental and control groups, with the experimental group showing improved results in the motor skills tests. The control group's results, however, remained relatively unchanged.

From this, the study recommends the following:

- Expanding the use of educational sports programs for primary school and preschool students.
- Monitoring the diversity of these programs to ensure they include exercises that target motor skills development to improve performance.
- Incorporating life skills into sports activity programs, connecting students' learning with real-life situations.
- Increasing student interest in engaging in educational sports activities by adding elements of excitement and competitive play.
- Focusing on competition, performance, and assessment in physical education activities.

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