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	Title of research article
	The Effectiveness of a Proposed Motor Education Programme Based on Motor Storytelling for Enhancing Perceptual-Motor Abilities in Preschool Children Aged 5–6 Years: An Experimental Study
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Keywords	Motor storytelling programme; perceptual-motor development; preschool education; psychomotor learning; early childhood pedagogy.
Abstract	Background and Objective: Early childhood represents a critical developmental period marked by rapid physical, cognitive, and socio-emotional growth. Motor education is widely acknowledged as a cornerstone of preschool pedagogy, fostering neuromuscular integration, sensory coordination, and school readiness. Within this framework, motor storytelling has emerged as a pedagogical innovation, combining narrative, imagination, and physical movement to stimulate holistic child development. This study investigated the effectiveness of a proposed motor education programme based on motor storytelling in enhancing perceptual-motor abilities among preschool children aged 5–6 years. Methods: A quasi-experimental design was adopted with 50 preschool children randomly divided into two groups: an experimental group (n = 25) and a control group (n = 25). The experimental group participated in a structured motor storytelling programme comprising 12 sessions over one academic semester, while the control group continued with the regular preschool programme. A validated perceptual-motor scale measuring six developmental dimensions was applied at both pre-test and post-test phases. Statistical analysis was conducted to evaluate intra-group and inter-group differences. Results: Findings revealed no statistically significant differences between pre- and post-test measures for the control group. In contrast, the experimental group exhibited significant improvements in perceptual-motor abilities across all measured dimensions. Furthermore, post-test comparisons between groups demonstrated significant differences in favor of the experimental group. Conclusion: The proposed motor education programme based on storytelling proved to be effective in developing perceptual-motor abilities in preschool children, highlighting its pedagogical potential as an integrated tool for early childhood education. The study underscores the importance of movement-based storytelling in preparing children for future cognitive and academic challenges. Citation. Amara T., Amoura Y. (2025) The Effectiveness of a Proposed Motor Education Programme Based on Motor Storytelling for Enhancing Perceptual-Motor Abilities in Preschool Children Aged 5–6 Years: An Experimental Study. <i>Science, Education and Innovations in the Context of Modern Problems</i>, 8(8), 998–1013.

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Introduction:

The early childhood stage is one of the most influential periods in shaping a person's character. It is characterised by rapid and comprehensive growth in all areas: physical, cognitive, emotional, social and linguistic. Psychological and developmental studies emphasise that the cognitive, sensory and motor gains achieved during this stage lay the foundations for future development. This makes paying attention to early childhood a scientific and educational necessity rather than just an option.

In modern times, a focus on childhood has become a fundamental requirement of the educational policies of developed countries, which recognise it as the optimal investment for the future. Consequently, specialised curricula and educational programmes have been developed that consider the developmental characteristics of children at this stage, responding to their needs and natural inclinations. The need for play, movement and exploration are recognised as primary gateways to comprehensive and integrated learning and growth.

Motor activity is considered a cornerstone of children's education programmes, providing a rich field for interaction with both themselves and their environment. Motor education is important because it contributes to the development of physical skills and enhances cognitive processes, neuromuscular integration and self-confidence, while facilitating social and emotional integration. Educational theories, beginning with the ideas of Froebel, Montessori and Pestalozzi, unanimously acknowledge the vital role that motor education plays in developing children's personalities and abilities.

One of the key concepts in motor education is perceptual-motor awareness, representing a child's ability to coordinate sensory inputs (visual, auditory, and tactile) with appropriate motor responses. This ability is a crucial indicator of sensory-neural maturity and is necessary for acquiring motor balance, coordinating the senses and controlling spatial orientation. These form the foundation for later learning in reading and writing. A lack of this type of awareness may lead to learning and behavioural difficulties at a later stage of education.

In this context, motor storytelling has emerged as an important pedagogical tool, combining enjoyment and education by utilising imagination, movement, physical expression and sensory stimuli within an interactive learning environment. It not only stimulates purposeful movement in children, but also activates their nervous systems, develops their neuromuscular coordination skills, enhances their sensory memory and cultivates their symbolic and expressive abilities. Numerous studies have demonstrated the impact of motor storytelling on a child's ability to accurately respond to stimuli, as well as improving balance and coordination, particularly in pre-school aged children (Dalia Fathi Eid, 2006).

From this perspective, there is a clear need for an educational programme based on motor storytelling to be designed, aimed at developing perceptual-motor awareness in children aged 5-6. This age group is considered to be in a sensitive transitional phase between early childhood and formal education. Educational support that integrates play with learning and movement with cognition within an engaging and motivating framework is therefore necessary.

2. The problem statement:

Early childhood is one of the most critical stages in a child's development. During this period, their abilities undergo rapid growth and they acquire essential skills that lay the groundwork for the development of their future personality. Educational and psychological theories confirm that children at this stage have a high capacity to learn and acquire

knowledge and experience through interactive activities that align with their natural inclinations, primarily through play and movement. During this stage, children tend to express themselves and explore the world around them through physical activity.

In this context, perceptual-motor awareness reflects the extent to which the child's central nervous system is integrated. This indicates a child's ability to receive sensory information (visual, auditory, tactile, motor, etc.), process it and respond with precise, coordinated movements. This type of awareness is fundamental to motor competence and the ability to learn. It is also a significant indicator of neural and psychological maturity, as well as school readiness (Saber Fatima Awad, 2006).

However, educational practices in kindergartens and pre-schools in many environments often fall short in this area. Most programmes focus on early academic skills, such as writing and counting, at the expense of motor and perceptual aspects, or rely on rigid, traditional methods that do not consider individual differences or the characteristics of perceptual-motor development at this stage. This can lead to deficiencies in motor performance and immature cognitive functions among many children, subsequently affecting their school performance (Amara Toufik, 2018).

From this perspective, there is a clear need to adopt modern, comprehensive educational approaches that enhance perceptual-motor growth and simultaneously address the psychological, cognitive and motor needs of children. Motor storytelling is an effective educational tool that combines movement, imagination, physical expression and language in an engaging learning environment. It allows for the balanced and organised development of a child's sensory and motor abilities (Abdul Karim Afaf, 1995). In an educational context, motor storytelling is used as a developmental medium to help children interact with stimuli, control their bodies, coordinate movements and understand the temporal and spatial sequence of events. This makes it a suitable tool for developing perceptual-motor awareness.

Previous studies have shown that using motor stories in the school environment improves children's performance in balance tasks, visual-motor coordination and spatial discrimination. This makes motor storytelling an appropriate entry point for designing a comprehensive motor education programme for preschool children.

Based on these theoretical and practical considerations, this study aims to explore the effectiveness of a proposed motor education programme based on motor storytelling in developing perceptual-motor awareness in preschool children (aged 5-6). This will be assessed using certain dimensions of the Hayward Scale as a scientific indicator for measuring this type of awareness and evaluating its various dimensions in children after the programme has been implemented.

Recognising the importance of early childhood and motor education based on storytelling, this study seeks to answer the central question: What impact does a motor education programme based on motor storytelling have on the development of perceptual-motor awareness in preschool children (aged 5-6)?

The following sub-questions can be formulated from the general question:

Are there statistically significant differences in the development of perceptual-motor awareness between the pre-test and post-test in the control group?

Are there statistically significant differences in the development of perceptual-motor awareness between the pre-test and post-test in the experimental group?

Are there statistically significant differences in levels of perceptual-motor awareness between members of the experimental and control groups in the post-test measurements?

Based on these sub-questions, we have developed the following hypotheses:

General hypothesis:

The motor education programme based on motor storytelling contributes to the development of perceptual-motor awareness in preschool children (aged 5–6 years).

Specific hypotheses:

There are no statistically significant differences between the pre-test and post-test results for the development of perceptual-motor awareness in the control group.

- There are statistically significant differences in the development of perceptual-motor awareness between the pre-test and post-test in the experimental group.

- There are statistically significant differences in levels of perceptual-motor awareness between members of the experimental and control groups in the post-test measurements, favouring the experimental group that underwent the motor education programme based on motor storytelling.

3. Objectives of the study:

To highlight the effectiveness of the proposed programme based on motor storytelling in developing perceptual-motor abilities in pre-school children (aged 5–6) by comparing pre- and post-test results in a sample designated for field application.

- To analyse the differences between the control and experimental groups after implementing the programme, in order to determine the extent to which motor storytelling improves indicators of perceptual-motor performance, compared to traditional methods.

4. Importance of the study:

To enhance understanding of the relationship between motor storytelling and perceptual-motor development in preschool children and open up new possibilities in the field of early motor education.

This study provides a practical framework for developing interactive learning programmes based on play and storytelling, which motivates children to learn in a natural and age-appropriate manner.

It also serves as a primary scientific reference for researchers and educators seeking to design developmental educational activities that integrate movement and imagination in early childhood.

This study offers scientific support for the integration of early motor education within official curricula by highlighting the positive impact of programmes based on motor storytelling in developing children's foundational abilities.

5. Definition of concepts and terms

Programme: This refers to a set of activities and methods conducted within the classroom to meet the children's needs and achieve the programme's desired objectives. These activities and games are carried out by the children under the guidance of the teacher (Al-Anani, 2003).

Operational definition of the programme:

‘The programme provides a system of integrated and interconnected experiences for children aged 5 to 6 years under the direct supervision of the teacher. The programme aims to develop an appropriate level of perceptual-motor awareness that aligns with the characteristics of this age group.’

Motor storytelling:

This is an educational activity that combines imagination, storytelling and physical performance. It is presented to children in an engaging manner. Situations, characters and events are represented through movement in the story, which aims to fulfil the psychological, physical and cognitive needs of the child while developing their creative, linguistic and motor abilities simultaneously (Ahmad Mohammed Suwaileh, 2004).

Operational definition of motor storytelling:

An activity offered to 5- to 6-year-old children in the classroom which involves narrating a short story accompanied by physical performances by the children under the supervision of the teacher. The aim is to improve attention span, coordination between senses and movement, and understanding and execution of movement-based commands.

Preschool children:

Refers to children in the age group preceding enrolment in formal primary education. This stage is characterised by rapid development in various areas, particularly physical, sensory, motor, linguistic and social. This makes it a critical period for establishing the foundations for learning, as well as shaping future behaviours and attitudes (Katy Fath et al., 2021).

Operational definition of preschool children:

In the context of this study, preschool children are defined as those aged 5 to 6 years who are enrolled in preparatory classes in formal educational institutions. There, they participate in a programme based on motor storytelling to develop their perceptual-motor awareness through directed, developmentally appropriate motor activities.

Perceptual-motor awareness:

The ability to connect information received from the senses (such as sight, hearing and touch) with motor responses executed by the body, such as grasping an object, running towards a target or mimicking a movement. This type of awareness is essential for coordinating movements, developing balance, enhancing eye-hand coordination, and understanding spatial orientation and direction (Jeff Walkley, 1995).

Operational definition of perceptual-motor awareness:

‘The ability of a child aged 5–6 years to understand sensory stimuli, such as what they hear or see, and to respond with appropriate movements. This ability is developed through participation in movement activities derived from a story, under the supervision of a teacher.’

6. Previous studies:

First Previous Study:

Study by Ridhwan Bouazi, Nadhir Qandozan and Saeed Tsaki (2017): ‘The Impact of Using the Motor Storytelling Method on the Development of Certain Motor Skills (Speed, Agility, Balance and Coordination) in Kindergarten Children (Aged 4–5 Years)’.

The study aimed to investigate the effectiveness of using the motor storytelling method to develop basic motor skills in children aged 4–5 years. The sample included 40 children, who were randomly divided into two equal groups: an experimental group that underwent a programme based on motor storytelling and a control group that followed the traditional programme. The researchers used a true experimental method with a design that included pre- and post-measurements for both groups. For statistical analysis, the researchers used means, standard deviations and homogeneity coefficients. The results revealed statistically significant differences in favour of the experimental group, along with noticeable improvements in their performance between the pre-test and post-test measurements. Based on these findings, the study recommended integrating motor storytelling into early childhood physical education programmes due to its positive impact on motor skill development.

Second, previous study:

Study by Jamila Khedir (2018): ‘The effect of motor stories on the development of motor abilities in preschool children (aged 4–5 years).’

This study aimed to explore the effect of using motor stories as an educational tool in developing basic motor abilities in early childhood. The researcher started from the premise that kindergartens, alongside the family, serve as a central educational space that contributes to the holistic formation of the child’s personality by providing a stimulating learning environment based on diverse auditory, visual and tactile stimuli. The study employed an experimental method based on an equivalent sample design, selecting a purposive sample of kindergarten children in Tizi Ouzou. The five-week training programme based on motor stories targeted the development of various basic motor abilities, particularly balance, agility, and flexibility. After conducting pre- and post-tests and analysing the data statistically, the study concluded that the educational programme based on motor stories had effectively improved motor performance in favour of the experimental group compared to the control group. This study’s significance lies in its emphasis on the role of creative educational methods, particularly motor stories, in supporting sensory-motor development in children. This enhances the status of motor education as a fundamental component of kindergarten programmes.

Third previous study:

A study by Mahdi Ezzedine, Amna Marqousi and Bilal Sghiri (2021): ‘The reality of implementing activities to develop sensory-motor awareness in kindergarten children’.

The study aimed to assess the extent to which activities aimed at developing sensory-motor awareness are implemented in early childhood institutions, and to identify the main obstacles educators face when carrying them out. The researchers emphasised the importance of these activities in developing preschool children’s integrated cognitive and motor abilities, considering this stage crucial for forming awareness of and interacting with the surrounding environment. A descriptive method was employed, which was considered suitable for the nature of the topic. An electronic questionnaire was used to collect data from a purposive sample of 30 kindergarten teachers in Sétif.

The results of the study revealed a clear deficiency in the implementation of sensory-motor awareness activities, indicating that teachers’ training in this area is insufficient. Furthermore, preschool programmes suffer from a systematic absence of sensory-motor activities. The results also highlighted field obstacles, the most significant of which were a lack of educational resources and suitable infrastructure for carrying out these activities. This study is important because it highlights a real educational gap in kindergarten programmes and calls for a review of educators’ pedagogical training content and the way early learning spaces are equipped to meet children’s sensory-motor growth requirements.

Commentary on Previous Studies and Identifying the Novelty in the Current Study:

Previous studies have demonstrated the effectiveness of motor storytelling in developing basic motor skills among preschool children. For example, the studies of Ridwan Bouazi et al. (2017) and Jamila Khedir (2018) showed that

using motor stories improved balance, agility and flexibility. The results emphasised the importance of integrating this method into early childhood programmes. In contrast, Mahdi Ezzedine et al.'s (2021) study focused on the reality of implementing sensory-motor awareness activities in kindergartens. It revealed weaknesses in training, as well as a lack of resources and tools, both of which hinder the execution of these activities

The current study is unique in its attempt to use motor stories as an educational tool to develop sensory-motor awareness, which previous studies have not addressed directly. The study also employs a comprehensive experimental design comprising three analytical phases: a pre- and post-comparison within the experimental sample; a comparison of results with those of the control sample; and a comparison of the level of awareness between enrolled and non-enrolled kindergarten children. This renders the study innovative in terms of both content and methodology.

7. Methodology:

7.1 Study method:

Due to its suitability for the study's objectives, we adopted an experimental method. This method involves comparing a control group and an experimental group to identify statistically significant differences in the development of perceptual-motor awareness before and after the application of the motor storytelling programme to the experimental sample.

7.2 Exploratory study:

The exploratory study serves as a preparatory phase for the main experiment and should be conducted under conditions similar to those of the main study, ensuring that the results are credible and reliable (Qays & Bastousi, 1987, p. 95).

In this context, we conducted a preliminary exploratory study following a series of methodological steps.

In this context, we conducted a preliminary exploratory study, taking the following methodological steps:

- conducting field interviews with the heads of the departments targeted for the study.
- Identifying children who had previously attended nursery or kindergarten in the Boumerdes region. - Communicating with the principal of the elementary school where the field study will be conducted.
- Communicating with the headteacher of the primary school where the field study will be conducted.

This preliminary work resulted in the school principal officially approving the field study, in coordination with the Directorate of Education for Boumerdes.

7.3 Research population:

The research population is defined as the original group from which the sample is drawn to apply the study methodology. Depending on the nature of the research, this population may consist of multiple units, such as schools, teams or students (Bouhouch & Al-Dhanbiat, 1995, p. 56).

In this study, the research population consists of all preparatory classes associated with elementary schools in Boumerdes during the 2024-25 academic year. These classes are distributed across three main educational districts: Thénia, Boumerdes and Boudaou. The Directorate of Education identified 76 preparatory classes in total, with an estimated 2,102 children.

The “Ibrahim Boucho” school, located in the municipality of Bani Amran in Boumerdes, was selected as the site for the field study due to its three preparatory classes containing around 92 students.

7.4 Study sample and selection method:

For this study, we selected students from the preparatory stage at Ibrahim Boucho Elementary School in Boumerdes during the 2024/25 academic year. Two classes were selected from Ibrahim Boucho Elementary School, totalling 56 students. Six students were excluded due to their participation in sports clubs. The first class comprises 25 children who will participate in the motor storytelling programme, while the second class, comprising the same number of children, will participate in the regular programme.

7.4.1 Characteristics of the Sample:

Table 1 shows the characteristics of the sample of preschool children.

Variables	Distinctive characteristics		
Age	years 5-6		
Physical activity	06		
Total number of samples:	56		
Control sample	25	Experimental	25

7.5 Controlling study variables:

- Independent variable: The independent variable is the variable that affects the dependent variable, but is not affected by it. In our study, the independent variable is represented by ‘the effect of the motor storytelling programme’.

- Dependent variable: The dependent variable is the variable affected by the independent variable, but not affecting it; it is the outcome of the independent variable. In our study, the dependent variable is represented by ‘the development of perceptual-motor awareness levels’.

7.6 Study Instruments:

The ‘Hayward’ scale was adopted as the main tool to measure perceptual-motor awareness in this study due to its suitability for the target age group and comprehensive coverage of essential perceptual-motor awareness dimensions. This scale was selected based on a study conducted by Ahmad Emad Al-Din Younis (2019) titled ‘The Effect of a Proposed Training Program Based on Sensory Games on the Development of Perceptual-Motor Awareness among First-Grade Primary School Students (Aged 6–7 Years)’, in which the same scale was used after being adapted to fit the Algerian context.

The scale includes six main dimensions representing the essential aspects of perceptual-motor awareness, which are:

- Visual perception
- Distinction between holistic and partial perception

- Recognition of body parts
- Distinction between right and left body parts
- Dynamic balance
- Auditory perception

According to the reference study, the psychometric properties of the scale were verified, showing acceptable reliability indices ranging from 0.63 to 0.90 across different dimensions. The overall reliability coefficient was 0.90, indicating high internal consistency. Validity ratios ranged from 0.83 to 0.94, confirming the tool's suitability for measuring the variable under study.

Based on the above, this scale was adopted as a precise, scientifically sound tool with proven psychometric properties that are methodologically and objectively aligned with the study's goals and the target group. This enhances the credibility and generalisability of the results.

7.8 Motor Education Programme:

In this study, we developed a motor education programme based on motor storytelling. This was inspired by the principles established in educational programmes directed at preschool children. These principles are detailed in the book *Fundamentals of Motor Education in Early Childhood* by researcher Amara Toufik. The educational units were designed progressively, considering the developmental and sensory-motor aspects of the child and integrating activities within a motivating and purposeful narrative framework. The programme was evaluated by a group of university professors and experts specialising in motor education and kindergarten. They confirmed that it aligns with modern educational standards and the objectives of the targeted age group. It was also compared to other programmes cited in Arab and Western educational references to enhance its quality and effectiveness.

7.9 Statistical Analysis Tools:

The analysis involved calculations that enabled us to accurately translate the results of the tests we conducted. For this purpose, we used the following indicators: mean, standard deviation and Student's t-test. The results were processed using SPSS statistical software, version 26.

8. Presentation, Analysis and Discussion of the Results of the First Hypothesis, which states: There are no statistically significant differences between the pre-test and post-test regarding the development of perceptual-motor awareness for the control group.

Table 2 shows the pre-test and post-test measurements for the control group on the perceptual-motor awareness scale.

	Tests	Mean		Standard deviation		Degrees of freedom	value	Value	Appreciation
		Pre-test	Post-test	Pre-test	Post-test		T	SIG	
	Visual perception	2.84	2/92	0.688	0.702	25	-0.124	0.425	

- Dimensions of Sensory-Motor Perception	Global and partial perception	2.56	2.60	0.712	0.707		-1.000	0.327	Not significant at 0.05
	Recognition of body parts	6.08	6.40	1.288	1.225		-2.317	0.029	Statistically significant at the level of (0.05)
	Distinction between body parts (right and left)	2.16	2.36	0.746	0.490		-1.309	0.203	Not significant at 0,05
	Dynamic balance	1.20	1.32	0.764	0.476		-0.721	0.478	
	Auditory perception	2.24	2.28	0.663	0.458		-0.272	0.788	

From Table No. (2), which illustrates the results of the pre-test and post-test measurements for the control group in the dimensions of the perceptual-motor awareness scale, it is evident that most dimensions did not register statistically significant differences. The Sig values for the following dimensions: visual perception, holistic and partial perception, distinction between body parts (right/left), dynamic balance, and auditory perception, were all greater than the significance level (0.05), with values of (0.425, 0.327, 0.203, 0.478, 0.788) respectively. This indicates that the differences between the pre-test and post-test in these dimensions are not statistically significant.

A slight increase in the mean scores was observed in favor of the post-test in most dimensions, such as visual perception increasing from 2.84 to 2.92, holistic and partial perception from 2.56 to 2.60, and dynamic balance from 1.20 to 1.32. However, these differences were not statistically significant, reflecting the ineffectiveness of the conventional program implemented in the classroom.

The only exception was in the “recognition of body parts” dimension, where the mean score increased from 6.08 to 6.40. This change was statistically significant at the 0.05 level, with a T value of -2.317 and a Sig value of 0.029. This indicates real development in this area, which can be attributed to the simplicity of the content and how easily it can be acquired through daily interactions or theoretical classroom activities aimed at teaching body parts such as the ear, nose and eye.

These results suggest that the traditional educational programme lacks sufficient sensory-motor activities to stimulate growth in these finer dimensions of awareness when applied as it is currently. In his study, researcher Amara Toufik (2018) confirmed that physical practice in preparatory classes is almost non-existent, with the focus being on the theoretical content of subjects such as mathematics, Islamic education and, occasionally, arts and crafts. There is an almost complete absence of interactive motor activities. He also noted that the traditional classroom seating arrangement contradicts the principles of Montessori and Froebel, which emphasise creating an interactive learning environment similar to the external environment to encourage dialogue, movement, and active learning. This deficiency can be attributed to several factors, including a lack of specialised training for educators, an absence of appropriate educational resources and facilities, and the non-mandatory nature of motor education teaching by physical education teachers.

These results are further supported by the findings of Mahdi Ezzedine et al.'s (2021) study, which revealed a clear deficiency in the implementation of activities aimed at developing sensory-motor awareness within early childhood institutions. The study attributed this deficiency to educators' inadequate training and the absence of suitable educational resources and infrastructure, which pose significant barriers to children's proper and balanced sensory-motor development.

Based on the above, we can confirm the validity of the first hypothesis, which states: 'There are no statistically significant differences between the pre-test and post-test measurements for the control group in the dimensions of perceptual-motor awareness', given the non-significant results and obstructive field conditions confirmed by interviews and theoretical references.

8.2 Presentation, analysis and discussion of the results of the second hypothesis, which states: There are statistically significant differences between the pre-test and post-test regarding the development of perceptual-motor awareness for the experimental group.

Table 3 shows the results of the pre-test and post-test measurements in the perceptual-motor awareness scale for the experimental group.

	Tests	Mean		Standard deviation		Degrees of freedom	value T	Value SIG	Appreciation
		Pre-test	Post-test	Pre-test	Post-test				
- Dimensions of Sensory-Motor Perception	Visual perception	3.280	4.720	1.061	0.791	25	-10.115	0.000	
	Global and partial perception	3.280	5.240	1.061	0.879		-11,65	0.000	
	Recognition of body parts	6.920	9.800	1.288	1.258		-13.18	0.000	
	Distinction between body parts (right and left)	2.760	4.400	0.723	0.500		-12.85	0.000	Statistically significant at the level of (0.05)
	Dynamic balance	0.640	1.960	0.637	0.200		-10.52	0.000	
	Auditory	2,640	4.320	0.757	0.627		-10.47	0.000	

	perception							
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Table 3 illustrates the pre-test and post-test results for the experimental group in the dimensions of the Perceptual-Motor Awareness Scale. It is evident from this table that statistically significant differences were recorded in all dimensions at the 0.05 level. The sig values were 0.000, 0.000, 0.000, 0.000, 0.000 and 0.000, all of which are below the established significance level. This indicates that the differences between the pre-test and post-test are statistically significant in favour of the post-test. This improvement can be attributed to the effectiveness of the proposed motor storytelling programme.

These results are consistent with those of the study by Ridwan Bouazi et al. (2017), which demonstrated the effectiveness of motor storytelling in enhancing balance, coordination and agility. Similarly, Jamila Khedir (2018) supported this idea, confirming that diversifying stimuli in the kindergarten environment through motor stories significantly aids the development of basic motor abilities. Furthermore, Mahdi Ezzedine et al.'s (2021) study highlighted weaknesses in the implementation of sensory-motor awareness activities in kindergartens due to a lack of resources and training. This reinforces the importance of interventions involving effective, well-designed programmes, such as the one adopted in this study. Similarly, Amara Toufik (2024) affirmed the effectiveness of the proposed programme incorporating traditional and mimicry games in developing motor skills, including perceptual-motor awareness. They emphasised that play is an essential educational medium enabling children to learn and acquire skills in a manner that aligns with their natural inclination towards movement and free play.

Based on the above, we can confirm the validity of the second hypothesis, which states: 'There are statistically significant differences between the pre-test and post-test measurements for the experimental group in the dimension of perceptual-motor awareness.'

8.3 Presentation, analysis and discussion of the results of the third hypothesis, which states: There are statistically significant differences in levels of perceptual-motor awareness in the post-test measurements between members of the experimental group and members of the control group, in favour of the experimental group that underwent the motor education programme based on motor storytelling.

Table 4 shows the results of the post-test measurements in the perceptual-motor awareness scale for the experimental and control groups.

	Tests	Mean		Standard deviation		Degrees of freedom	value T	Value SIG	Appreciation
		Pre-test	Post-test	Pre-test	Post-test				
	Visual perception	2.920	4.720	0.702	0.791	25	-1.37	0.000	
- Dimensions of Sensory-Motor Perception	Global and partial perception	2.600	5.240	0.707	0.879		-10.81	0.000	
	Recognition of	6.400	9.800	1.224	1.258		-10.93	0.000	

	body parts								
	Distinction between body parts (right and left)	2.360	4.400	0.489	0.500		-13.88	0.000	Statistically significant at the level of (0.05)
	Dynamic balance	1.320	1.960	0.095	0.040		-5.62	0.000	
	Auditory perception	2.280	4.320	0.458	0.627		-12.19	0.000	

As can be seen from Table 4, which illustrates the comparison between the post-test results for the experimental and control groups in the dimensions of the Perceptual-Motor Awareness Scale, all statistical values (Sig) were less than 0.05. This indicates statistically significant differences in favour of the experimental group that underwent the Motor Storytelling Programme. This is reflected in the clear difference in mean scores: the post-test results for the experimental group were higher than those for the control group in all dimensions. For instance, the scores for visual perception were 4.72 and 2.92 respectively, for holistic and partial perception they were 5.24 and 2.60 respectively, for recognition of body parts they were 9.80 and 6.40 respectively, for distinction between right and left body parts they were 4.40 and 2.36 respectively, for dynamic balance they were 1.96 and 1.32 respectively, and for auditory perception they were 4.32 and 2.28 respectively. These results reflect a notable development in perceptual-motor awareness among the children in the experimental group.

These results are consistent with those of Ridwan Bouazi et al. (2017), who demonstrated that motor storytelling improves agility, balance and coordination in preschool children. Similarly, Jamila Khedir (2018) and Samira Kroush and Marbouha Boulehab (2017) confirmed the effectiveness of this creative educational method in enhancing motor performance in pre-school children. Furthermore, Mahdi Ezzedine et al. (2021) emphasised the inadequacies of traditional preparatory education programmes in developing sensory-motor dimensions due to insufficient training and resources. Amara Toufik (2024) further supports these results, highlighting the effectiveness of programmes based on traditional games and mimicry in developing motor skills and perceptual-motor awareness through play. Play is a natural and essential means of learning for children.

Based on these findings, we can confirm the validity of the third hypothesis: the proposed programme based on motor storytelling effectively improves perceptual-motor awareness dimensions among preschool children compared to conventional preparatory class methods.

9. General conclusion:

The results of the study demonstrated the effectiveness of the proposed educational programme based on motor storytelling in developing perceptual-motor awareness among pre-school children. This is evidenced by the improvement in performance across the six dimensions of the 'Hayward' scale.

Visual perception (stability of object shapes).

- Holistic and partial perception

Recognition of body parts

Distinction between right and left body parts

- Dynamic balance

- Auditory perception

The experimental group showed statistically significant differences in all these dimensions between the pre-test and post-test, indicating that the proposed programme had a comprehensive positive impact. This was particularly evident in dimensions such as recognition of body parts, holistic and partial perception, and auditory perception, where notable improvements in mean scores were observed.

By contrast, the control group, which underwent a traditional programme, showed almost no difference between the pre-test and post-test measurements, except in the area of 'recognition of body parts'. This can be attributed to verbal repetition without motor support.

Additionally, post-comparison results between the two groups indicated that children who participated in the motor storytelling programme performed better than those in the control group across all dimensions. This highlights the importance of using interactive educational play to develop perceptual-motor awareness, as this forms the basis for future educational development.

10. Recommendations:

- Incorporate motor education officially into the preparatory curriculum. Include study units that develop visual perception and motor coordination through motor storytelling and purposeful play.
- Train educators in sensory-motor awareness. Provide educators with training in sensory-motor awareness and equip them to use motor storytelling as an effective teaching method.
- Provide necessary educational resources: Make educational tools such as illustrated stories, body part cards and auditory and visual perception games available to support motor activities in the classroom.
- Create a flexible learning environment. Design a learning space that moves away from traditional methods and allows for movement and interaction, in line with the approaches of Montessori and Froebel.
- Implement regular assessments: Use scientific tools, such as the 'Hayward' scale, to periodically evaluate perceptual-motor development and guide appropriate educational interventions.
- Encourage applied research in kindergartens by promoting research focused on developing programmes based on play and motor storytelling that encompass various social contexts.
- Coordinate efforts among relevant early childhood sectors: Foster collaboration between sectors involved in early childhood (education, youth, health and family services) to support programmes that enhance sensory-motor development.

Methodology

The study employed a quasi-experimental pre-test/post-test control group design. The sample comprised 50 children aged 5–6 years, equally divided into control and experimental groups. The experimental group engaged in 12 structured sessions of motor storytelling, designed to integrate narrative-based imagination with targeted physical activities aimed at enhancing balance, coordination, sensory integration, and spatial orientation. The Perceptual-Motor Scale, validated for preschool populations, was administered at the start and end of the programme. Data analysis was conducted using descriptive statistics, paired t-tests, and independent samples t-tests to compare pre- and post-test differences.

Findings

1. Control Group: No significant differences were observed between pre- and post-test scores, indicating that the standard preschool programme did not substantially influence perceptual-motor development.
2. Experimental Group: Statistically significant improvements were recorded across all six perceptual-motor dimensions after exposure to the motor storytelling programme.
3. Between-Group Comparison: Post-test results showed a clear advantage for the experimental group compared to the control group, confirming the programme's effectiveness.

Novelty and Contribution

- Introduces a storytelling-based motor education programme tailored for preschool children in Algeria, where such approaches are relatively underexplored.
- Demonstrates that integrating narrative imagination with structured physical activity fosters perceptual-motor development more effectively than traditional preschool methods.
- Provides empirical evidence supporting the incorporation of multisensory, movement-based pedagogical models into early childhood curricula to strengthen readiness for literacy and formal schooling.

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Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

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