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Impact Of Exercises On The Development Of Motor Intelligence Among Pre-School Children Aged 5-6 Years

Impacto De Los Ejercicios En El Desarrollo De La Inteligencia Motora Entre Los Niños De Preescolar De 5 A 6 Años

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ABSTRACT/ Motor intelligence could be understood and explained through intellectual abilities, but limited data are available to provide criteria for making informed decisions about children in different environmental settings. The research is intended to study the development of motor intelligence in children aged 5-6 years using the proposed exercises. In the study, 16 children were employed in the investigation. The children were divided into two groups classified as an experimental group of 8 children and a control group of 8 children. The different groups were engaged differently, the children in the experimental group were engaged in the physical practice of the proposed exercises for the development of motor intelligence, while the children in the control group were engaged in the practice of classical exercises in physical education. The group practice was conducted for 30 minutes, twice a week for six weeks. Upon completion of the children's training, the children were examined and evaluated on the activities they carried out in order to determine the development of the competence to manage the activities. The results showed that the physical involvement of children increases their level of understanding of the activities as well as their competence. It was observed that children in the experimental group could increase their incompetence by 300 per cent over the control group who were theoretically trained before taking the final physical competence test.
Keywords: Motor intelligence, Development , physical education , Pre-school Children .
RESUMEN/ La inteligencia motora podría entenderse y explicarse a través de habilidades intelectuales, pero hay datos limitados disponibles para proporcionar criterios para tomar decisiones informadas sobre los niños en diferentes entornos ambientales. El objetivo de la investigación es estudiar el desarrollo de la inteligencia motora en niños de 5 a 6 años utilizando los ejercicios propuestos. En el estudio, 16 niños fueron empleados en la investigación. Los niños se dividieron en dos grupos clasificados como un grupo experimental de 8 niños y un grupo control de 8 niños. Los diferentes grupos se involucraron de manera diferente, los niños en el grupo experimental se dedicaron a la práctica física de los ejercicios propuestos para el desarrollo de la inteligencia motora, mientras que los niños en el grupo de control se dedicaron a la práctica de ejercicios clásicos en educación física. La práctica grupal se realizó durante 30 minutos, dos veces por semana durante seis semanas. Al finalizar la capacitación de los niños, los niños fueron examinados y evaluados en las actividades que llevaron a cabo para determinar el desarrollo de la competencia para gestionar las actividades. Los resultados mostraron que la participación física de los niños aumenta su nivel de comprensión de las actividades, así como su competencia. Se observó que los niños en el grupo experimental podrían aumentar su incompetencia en un 300 por ciento sobre el grupo de control que fueron entrenados teóricamente antes de tomar la prueba final de competencia física.
Palabras clave: inteligencia motriz, desarrollo, educación física, niños en edad preescolar

1. Introduction

Human development involves the development of intellectual abilities, social-emotional skills and physical motor skills (Stodden et al. 2008). There is an inter-relationship between the development of individuals in all areas, so that they do not occur in isolation. The different facets of development can be

independently studied in order to promote quality education practices and to plan for the future development of individuals. Studies have shown that motor development is linked to social-emotional adjustment, general health and occupational adjustment as one matures (Deb 2018, Pham and Murray 2018). Motor intelligence development as well as intellectual skills, social-emotional skills among children need to be understood in such a way that they can be managed properly and aligned to enhance their potential.

Libertus and Hauf (2017) pointed out that previous studies have not shown a clear relationship between child developmental differences and the various factors that influence motor development. They also pointed out that there is still a lack of proper information in the relationship between psychomotor and other developmental domains. Leonard and Hill (2015) argued that motor skills and cognition are mostly studied separately, while there is a close relationship between motor skills and other developmental abilities. Considering that research in physical activity and physical education rarely seeks children's perspectives (Macdonald et al. 2005), there is a need for extensive research and understanding of psychomotor development as children grow. Preschool motor intelligence still needs to be extensively researched to help children develop their intellectual and social-emotional skills properly. Motor intelligence should be a core subject within children Curriculum because of its primary focus on linking body and mind. Motor intelligence addresses the physical and intelligence developmental objective of the pre-school curriculum in a unique way and also makes a significant contribution to the moral, social and cultural development of children. Inculcating the developmental psyche of motor intelligence in children builds their interest in patterns of activity that are essential for healthy development and lays the foundation for active lifestyles. Intelligence is one of the most important variables in motor skills learning, especially for children as it is closely related to mental activity (Shalsh and Mahmoud 2007). Some children have difficulty in exercising, which may be an act of laziness or lack of movement of certain parts of the body, and thus have a clear relationship with motor and mental abilities, whether sporting or intellectual (Burger 1984). Consensual growth in the kinetic ability of motors to balance children's growth in coping with mental abilities is needed, and therefore motor intelligence is an important factor in the proper development of children (Somerset and Hoare 2018). Making motor intelligence a core subject in mental motor training Curriculum would stimulate significant health and educational benefits, such as improved physical well-being, mental alertness and self-confidence in school children.

This investigation is based on the assumption that the development of motor intelligence will help educators better adapt the intervention method that is appropriate when children begin to deviate from normal development during their growth. The study explored the lack of use of the concept of motor intelligence in the daily program. Previous studies have shown that educators rarely use the concept of motor intelligence in their interventions, although a lot of highly relevant literature on the use of motor intelligence as an intervention. The development of cognitive intelligence and intelligence quotient is analyzed because the work of the cognitive intelligence framework and important tests could help us to operationalize motor intelligence. This research presents strategies for the creation of open education systems using motor intelligence.

2. Methodology

The method used in this study is based on the procedures presented by Cohen, Manion, and Morrison (2007) which can be described as questions and "search for the truth" and thus forms a framework for all the actions of the study in this research, which seeks to explore, investigate, investigate and map the answers to the question. In this case, the activities are designed to determine the impact of the proposed exercises on the development of motor intelligence for children aged 5-6 years.

This study received proper ethical approval from the Faculty of Physical Education and Sports at the University of Tikrit. Field work was carried out from 2 April 2017 to 15 May 2017. The study aimed to investigate the efficacy of the proposed motor intelligence development exercises for children aged 5-6 years with a mean age= 5.6 years with a sample size of 22 children. The 22 children were grouped into three as a pilot study group of 6 children, an experimental group of 8 children and a control group of 8 children. The control group took part in physical education classes twice a week for a duration of 30 minutes in each class. Similarly, the experimental group carried out the proposed exercises twice a week for 30 minutes. The experimental group participated in a practical commitment to drop the ball test, the sound test and the movement test, and to walk to the circle test following the Dhakaa model (2011). The participation and grouping of children is shown in Table 1 below.

Table1. Participating Children Groups and Population

Activity Grouping	Population	Total Participants
Pilot-Study Group	6	22
Control Group	8	
Experimental Group	8	

1. Result Analysis and Discussion

The study was observed and all engagement data for 12 weeks were taken. The data generated in the study were analyzed using a descriptive static procedure (mean and standard deviation) and an inferential statistical procedure (T-test) considering an alpha level of 0.05.

1.1.Hypothesis Testing of Control Group Pre-Test and Post-Test Analysis

The analysis of pre-test and post-test activities for the control group is shown in Table 1 below. The table presents the mean, standard deviation and t-test analysis of the performance of children engaged in the activities of ball drop, sound and movement, walk to circle, taking into account the pre-test (pre-test) and post-test (post-test) of the control group.

Table 2. T-test analysis between pre-test and post-test for Control Group.

Activity (Variable)	Measuring (Unit)	Control Group					
		Pre-Test		Post-Test		T-Test	Sig
		Mean	Standard Deviation	Mean	Standard Deviation		
Dropping the ball	Cm	49.00	3.295	43.25	2.915	41.95	0.00
Sound and move	Se	9.25	0.707	6.250	0.707	25.0	0.00
Walk to circle	D	1	0.535	1.375	0.517	7.514	0.00

T-value is significant at $p < 0.05$

Where Cm is centimetre; Se stands for Seconds and D stands for Degree .

The results from Table 2 and Figure 1 below showed that a mean of 49.00 cm with a standard deviation of 3.295 was recorded when the ball test (pre-test) was dropped, while the post-test showed a mean of 43.25 cm with a standard deviation of 2.915. The difference in arithmetic mean was statistically significant for the T-Test analysis, which indicated that t= 41.95 at $p < 0.05$ at sig (0.00). The results analysis showed that there was no significant difference in the ball drop test between the pre-test and post-test practices within the control group. The second variable appears to have made some improvements.

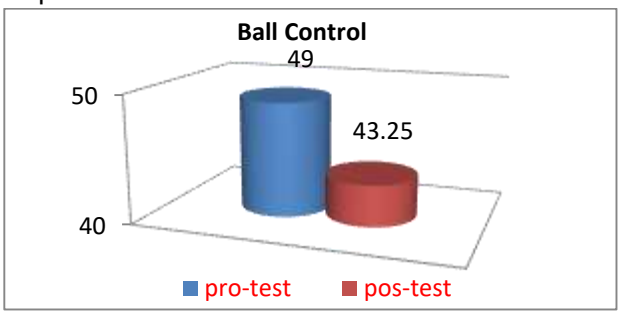

Figure 1. Bar Chart showing difference between pre-test and post-test in the dropping the ball by the control group.

The pre-test recorded a mean value of 9.25 seconds with a standard deviation of 3.295 seconds while the post-test showed a mean value of 6.25 seconds with a standard deviation of 0.707 seconds as shown in Table 2 and Figure 2. The T-test resulted in a value of 25.0 at $p < 0.05$ with sig (0.00). As a result, there is no significant difference in sound and movement between the initial test and the final test in the control group, rather it shows that as children are trained, it takes time for them to complete the task to reduce. This infers that intelligent motor effect on intellectual abilities.

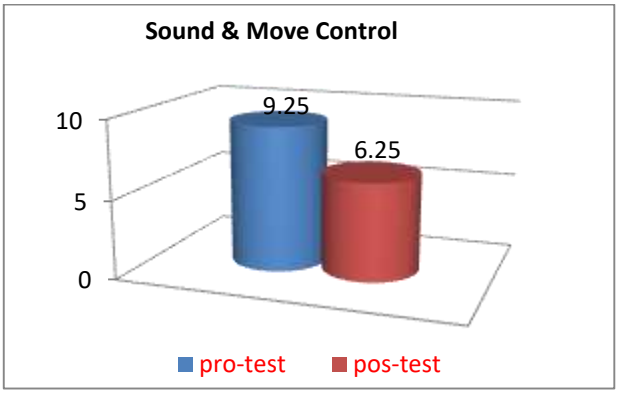

Figure 2. Bar Chart showing difference between pre-test and post-test in the sound and move by the control group.

Following the result as shown in Table 2 and Figure 3, the activity of walking to a circle appears to have been determined that the mean for pre-test engagement was 1.0 degrees with a standard deviation of 0.535, while the mean value for post-test engagement was 1.375 with a standard deviation of 0.517 degrees between control group participants. The calculated t-value was 7.514 at $p<0.005$, indicating sig (0.00). As a result, there is no significant difference between the initial test and the final test in the control group.

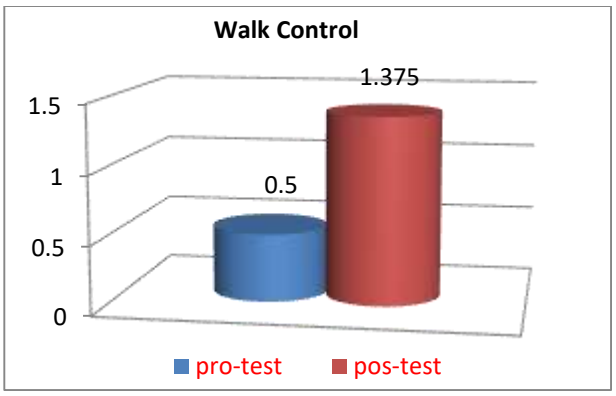

Figure 3. Bar Chart showing difference between pre-test and post-test in the walk activity by the control group.

1.2. Hypothesis Testing of Experiment Group Pre-Test and Post-Test Analysis

The analysis of the pre-test and post-test activities for the experimental group is presented in Table 3 below. The table shows the mean for the performance of the 8 children involved in the activities, the standard deviation from the mean was also assessed for each of the activities and the t-values were determined. The table shows differential performance improvements between pre-test and post-test child engagement.

Table 3 T-test analysis between pre-test and post-test for Experimental Group

Activity (Variable)	Measuring (Unit)	Experiment Group					
		Pre-Test		Post-Test		T	Sig
		Mean	Standard Deviation	Mean	Standard Deviation		
Dropping the ball	Cm	49.5	2.77	12.25	3.19	10.841	0.00
Sound and move	Se	9.37	0.744	3.625	0.744	13.781	0.00
Walk to circle	D	0.5	0.535	4	0.755	14.967	0.00

T-value is significant at $p < 0.05$

Where Cm is centimetre; Se stands for Seconds and D stands for Degree

The results presented in Table 3, which is supported by Figure 4, show t-test analysis of the drop in ball activity, where post-test improvements of about 300 per cent are presented over the pre-test result. A mean

value of 49.5 cm with a standard deviation of 2.77 was observed when the pre-test ball was dropped, while the children's post-test engagement recorded a mean value of 12.25 cm with a standard deviation of 3.19. The T-Test resulted in 10.841 $p < 0.05$ with sig (0.00) indicating a significant difference in the ball drop between the pre-test and the post-test in the experimental group. This reflects the fact that the children's experience has had a higher impact on their performance compared to the results obtained from the control group.

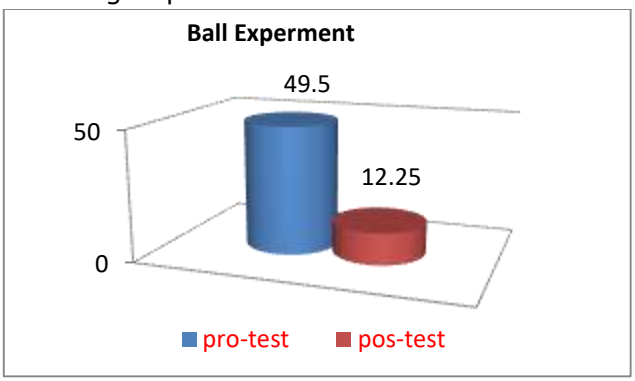

Figure 4. Bar Chart showing experimental group's pre-test and post-test difference in dropping the ball.

In the sound and motion activity presented in Table 3 and Figure 5, it was also observed that there was an improvement in the experimental group, as the pre-test exercise recorded an average of 9.37 seconds with a standard deviation of 0.744 compared to post-test engagement, which recorded an average of 3.625 seconds with a standard deviation of 0.744 to com. The T-Test resulted in 13,781 at $p<0,05$ at sig(0.00) reflecting the significant improvement achieved through the experimental involvement of children in activities prior to the final (pro-test) activity.

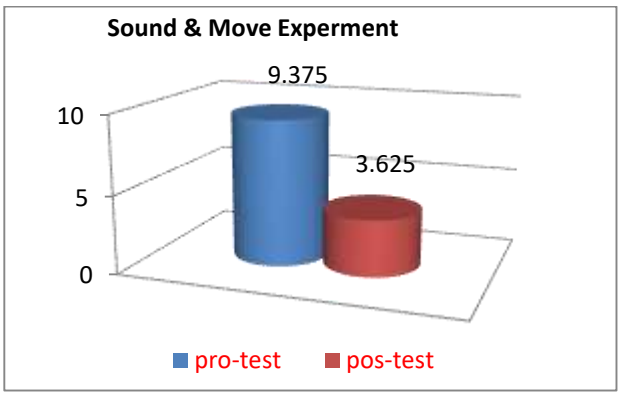

Figure 5. Bar Chart showing experimental group's pre-test and post-test difference in sound and move.

The results as shown in Table 3 and Figure 6 showed that the pre-test recorded an average of 0.5 degrees with a standard deviation of 0.535, while the post-test results as assessed showed a mean of 4 degrees with a standard deviation value of 0.755. The T-Test result indicated a value of 14,967 at $p < 0.05$ with sig (0.00) which represents an increase in the ability of children to walk in the circle compared to the results obtained in the control group.

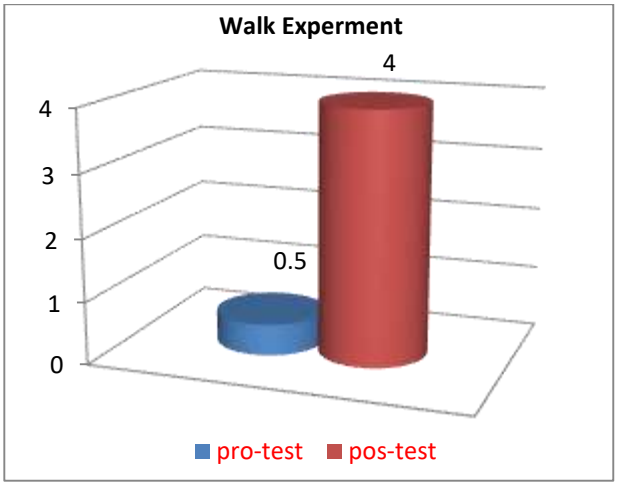

Figure 6. Bar Chart showing experimental group's pre-test and post-test difference in walk to circle.

1.3. Hypothesis Test on Experimental Group and Control Group based on Pre-Test and Post-Test Analysis

In Table 4 below, the results of the post-test activities for the experimental group and the control group are presented. In the table the mean, the standard deviation from the means were also evaluated for each of the activities in

consideration of the number of children in each group and the t-values determined.

Table 4: T-test analysis between Experimental Group and control group

Activity (Variable)	Measuring (Unit)	Experimental and Control Groups					
		Experimental Group		Control Group		T	Sig
		Mean	Standard Deviation	Mean	Standard Deviation		
Dropping the ball	Cm	12.250	3.195	43.250	2.915	-20.268	0.00
Sound and move	Se	3.625	0.774	6.250	0.707	-7.233	0.00
Walk to circle	D	4	0.755	1.375	0.517	8.104	0.00

T-value is significant at $p < 0.05$

Where Cm is centimetre; Se stands for Seconds and D stands for Degree

The results of the drop in ball activity for the experimental group and control group are shown in Table 4 and Figure 7 following the post-test output of the two groups. The results showed that the experimental group had made differential improvements over the control group. This is due to the fact that the experimental group recorded a mean variance of 12,250 cm with a standard variance of 3,195 cm compared to the control group which recorded a mean variance of 43,250 cm from the target showing a standard variance of 2,915 between the children in the group. The calculated t-value was-20,268 at p<0,05, indicating a significant difference in the development of the experimental group over the control group in the post-test.

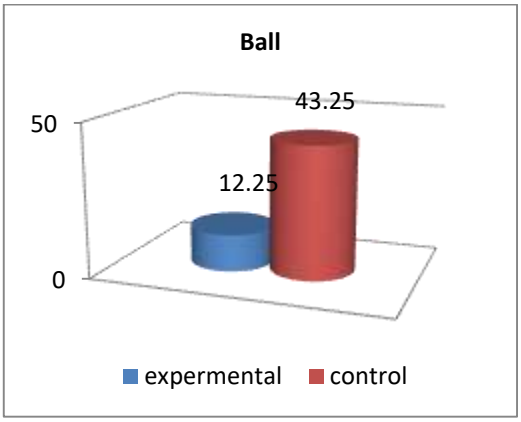

Figure 7. Bar Chart showing the difference between the experimental group and the control group considering the reduction of the ball activity.

The comparison of sound and motion activity between the experimental group and the control group is shown in Figure 8 with respect to the result as shown in Table 4. The results indicated that the mean duration of the experimental group for the activity was 3.625 seconds with a standard deviation of 0.744 while the mean time for the control group was 6.250 seconds to complete the activity with a standard deviation of 0.707. The t-value measured between the two groups indicated-7,233 at p<0,05 with sig (0.00) which inferred that the experimental group developed in the activity through practical engagement and reduced the time spent in the activity compared to the control group. This indicates that the experimental group saves 50 per cent of the time spent by the control to complete the same activity, indicating an increase in competence.

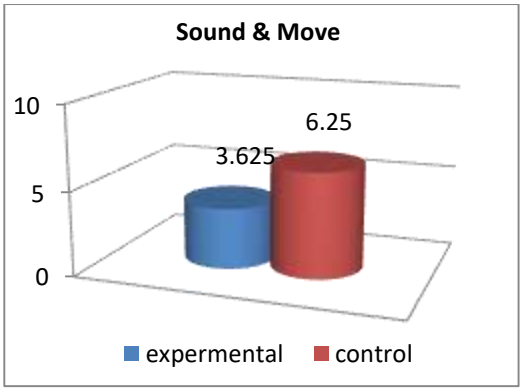

Figure 8. Bar Chart showing the difference between the experimental group and the

control group for the activity of sound and movement..

The results of the walk to the circle activity conducted by the experimental group and the control group were also analyzed and presented as shown in Figure 9 and Table 4. In the walk to the circle post-test results, the experimental group recorded an average of 4.00 degrees with a standard deviation of 0.755, while the control group recorded a mean value of 1.375 degrees with a standard deviation of 0.517. Considering the evaluated t-value of 8.104 at $p<0.05$ and sig(0.00), the results showed a significant difference of approximately 300 per cent between the experimental group and the control group.

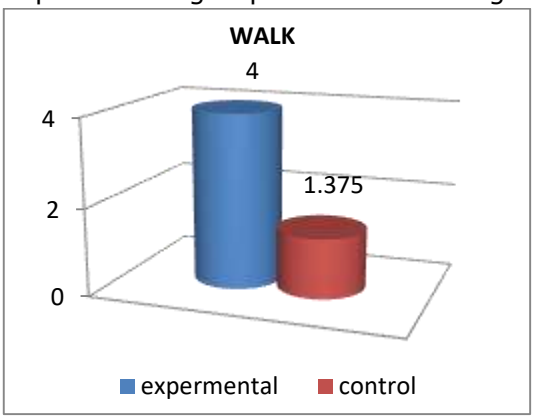

Figure 9. Bar Chart showing the difference between the experimental group and the control group for walking to circle 2.

2. Conclusions

Considering the definition of motor intelligence as presented by Al-qatami (2009) which stated that motor intelligence is the ability of the body to solve a specific problem, this study involved children through different training processes to determine developmental defense through psychomotor use. In this study, the researchers assess the effect of three exercises and the learning process on the development of motor intelligence for pre-school children aged 5-6 years. The two groups involved in the main study were classified as an experimental group and a control group. The experimental group was trained on the basis of experience, while the control group was trained on the theory, and both were finally tested on the three activities. It has been observed that the experimental group has improved performance in all activities compared to the control group. It has shown that children's motor intelligence is of vital importance and has a crucial influence on their development in general, especially in the case of pre-school children. It affects their intellectual, social and emotional characteristics. If children are unable to allow proper development and progress in terms of their motor skills and abilities, they are more likely to have less self-confidence and more difficulty in communicating with their environment and in dealing with everyday situations. The significant difference between the experimental group and the control group showed that motor intelligence should be observed by learning by playing, learning by doing what happens through the physical movement of the body. It is a known way to perform many tasks with regard to body movement, such as dancing, making specific movements in style, grabbing, walking balance, etc., and thus can be classified as physical intelligence.

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