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Original Article

Learning and developing motor skills in the case of secondary school pupils with mild mental impairment

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Abstract:
The premise upon which this study is based is that, in the case of pupils with mild mental impairment, the process of learning and consolidation of basic and specific motor skills yield results when they are aided, leading to performances according to the area of the proximate development. *The purpose of the paper* is to analyse the correlation between the pupils' IQs and their results at target and hoop throwing. The research was conducted by using an experimental group of 20 pupils (15 boys and 5 girls; 19 present mild mental impairments and 1 presents liminal intellect), aged between 11 and 12; the control group is composed of 20 pupils (14 boys and 6 girls; 14 present mild mental impairments and 6 present liminal intellect), aged between 13 and 14. The results confirm the fact that the development of motor skills does not depend on IQ.
Keywords: motor skills, intelligence quotient, learning, cognition.

Introduction

The motor skill represents the qualitative trait of learned motor acts and can be defined as "an automatized component of the voluntary motor act, a motor act or action which, through exercise, has reached a high degree of stability, precision, efficiency, which ensure the success of the execution to the desired effect" (Herczeg, 2005). Starting from this definition, we ask ourselves the question: in what ways can motor skills be learned and solidified in the case of mental impairments? What happens in the case of mild mental impairments, with an IQ between 50 and 69? Are there significant differences in the learning process? We ask these questions knowing that the maximum level of development of a person suffering from mild mental impairment is that of a 12 year old, who theoretically will be able to conduct independent activities in his/her later social development, start a family and develop socially; as concerns the level of cognition and skills, these too can be developed up to a certain point.

Intellectual deficit is "an insufficiency of mental effectiveness, which represents one of the important clinical aspects of a mental deficiency, determining the incapacity of the subject to respond in an adapted way to the demands of the environment" (Bloch H., Chemama R., 2006). Intellectual deficiency is not a disease (even if it can be a consequence of one), but it is a different way of mental functioning and organization (Paunescu C., 1976, 1977).

There are differences between intellectual handicap and mental handicap: mental handicap "constitutes pathology of organization and functionality…, while intellectual handicap has a normal mental organization, but one when faced with a pathogenic aggression or overload cannot overtake certain limits of adapting or learning." (Păunescu C, Muşu I., 1997)

In this case, assisted learning, the one in which the pupil can profit from assistance and support, is most indicated and starts from the idea that the *area of the proximate development* (Vîgotsky, 1978) allows a certain degree of improvement. It is about a certain phase in learning in which the pupil can profit from assistance and support. The lower threshold of this area is the one in which the pupil exercises an ability (already gained) independently. The upper threshold refers to the accomplishment of a (new) task with support from another person. Guiding the learning process towards the area of proximate development mainly presumes going through three stages: starting from the incapacity to solve the problem to its solving with support and then to independently solving the problem.

The present study will analyse the connection between mild mental impairments and basic (target throwing) as well as specific (hoop throwing) motor skills. We chose these basic skills because they require, besides precision, attention and concentration. The motor skills are related to physical activity (Butcher& Eaton, 1989, Fisher et al, 2005, Wrotniak et al, 2006). In order to accomplish the objectives, pupils with mild mental impairments will learn the algorithms of throwing (target or hoop) by concentrating on aiming towards the hoop or the circle by arm-eye-target coordination or just arm-eye and later eye-target coordination. Motor learning is of a better quality when a cognitive treatment of the information is conducted by the subject, even by pupils with a limited IQ; this is why we aim to analyse the condition of the IQ's limitations on motor intelligence.

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The purpose of the paper is to analyse the correlation between the pupils' IQs and their results at target and hoop throwing.

Research hypothesis

Mild mental impairment is not responsible for a better or worse acquisition of basic or specific motor skills. However, using preparatory games leads to a reduction of the time span necessary for the initiation and fixation of the basic technical elements from basketball.

Material and methods

The experiment was conducted during the two semester of the 2011-2012 scholastic year, at the Educational Centre for Inclusive Education "Constantin Paunescu" from Recaș. For this experiment, we used as an experimental group 20 pupils (15 boys and 5 girls, 19 with mild mental impairment and 1 with liminal intellect) from the 5th and 6th grades. The control group is composed of 20 7th and 8th grade pupils, 14 boys and 6 girls, 14 with mild mental impairment and 6 with liminal intellect (as evaluated by the school psychologist).
For the appreciation of the pupils' level of psychomotor development, a battery of 2 tests has been applied:

- Target throwing

- Description: with the help of chalk, two circles with diameters of 80 and 30 centimetres will be marked on a wall. The circle will be drawn 2 meters away from the wall. The pupil has the right to 3 executions.
- Grading: the pupil obtains 3 points if he/she manages to score within the small circle, 2 points if he/she scores within the large circle, and 1 point if he/she hits the wall, but does not manage to score by hitting within the circle or its margins. The pupil's score will be the sum of the points obtained by the player following the 3 target throws.

- Hoop throwing with a basketball

- Description: 9 points are marked on the floor. In order to establish their position, a reference point will be taken in front of the basketball hoop. The distances where these points can be found are the following:
  - no.1- no.2- no. 3= 1,5m
  - no.4- no.5- no.6 = 1,5m
  - no.7- no.8- no.9 = 1,5m

-Grading: -for each hoop scored from points 1, 2 and 3, the pupils receives 2 points
- for each hoop scored from points 4, 5 and 6, the pupils receives 3 points
- for each hoop scored from points 7, 8 and 9, the pupils receives 4 points
- for each of the pupils' executions that is not finalized with the scoring of a hoop, but in which the ball touches the panel or the ring of the hoop, the pupil receives 1 point

- The results to this task will be the sum of the 18 throws.

Results

1. Calculation of the statistical correlation in the case of the experimental group and the control group between the three somatometric indexes and between the somatometric indexes (height, weight, span) and the pupils' IQs.

Following the calculation of the correlation between the somatometric indexes and the IQ, in the case of the experimental group it can be noticed that no somatometric index correlates with the IQ; no association is recorded, as one can notice in Table no. 1. Still, a strong positive association can be noticed between height and weight and between height and span.

Table no. 1 The experimental group

Somatometric indexes	Height	Weight	Span	IQ
Height	-	0,864185	0,93696	0,06
Weight	0,8642	-		-0,0009
Span	0,937		-	-0,006
IQ	0,06	-0,0009	-0,006	-

Following the calculation of the correlation between the somatometric indexes and IQ in the case of the control group a small association between height and IQ, and a weak positive association between weight and IQ, and between span and IQ, can be noticed (see Table no. 2). Furthermore, a strong positive association between height and weight and between height and span can be noticed.

Table no. 2 Control group

Somatometric indexes	Height	Weight	Span	IQ
Height	-	0,801254	0,93464	0,23
Weight	0,8013	-		0,31*
Span	0,9346		-	0,38*
IQ	0,23	0,31	0,38	-

2. Comparison of the correlation between the results from the initial testing and IQ, and the final testing and IQ in the test of basketball target throwing

From Table no. 3, one can notice that in the case of the experimental group a small association between the results from the initial testing and IQ can be noticed; the case is the same upon initial testing. In the case of the control group, no association is recorded between IQ and the results of the initial testing. However, upon final testing, a weak positive association is recorded.

Table no. 3

Group	IQ-Ti	IQ-Tf
Experimental	-0,005	-0,18
Control	0,13	0,34

The weak positive association in the case of the control group can be explained by the fact that the results recorded for this group are better in the case of both tests that in the case of the experimental group, and the mean value of the IQ in the case of this group is higher than in the case of the experimental group.

The small association in the case of the experimental group can be explained by the fact that the progress recorded is not significant and this is not due to the IQ, but to other factors. We stress the fact that the recorded number of points by the experimental group is high even upon initial testing and that the IQ is not responsible for this fact.

3. Comparison of the results to the initial and final tests of basketball hoop throwing.

From Fig. no 1, one can notice a major increase in case of all the pupils from the experimental group. A top score of 32 points was obtained by 2 pupils, a score registered upon final testing. The specific skill of throwing the basketball to a hoop is a complex skill which requires the handling of the ball, its projection on the trajectory, arm-foot coordination. This is why significant results are recorded between the initial and final testing.

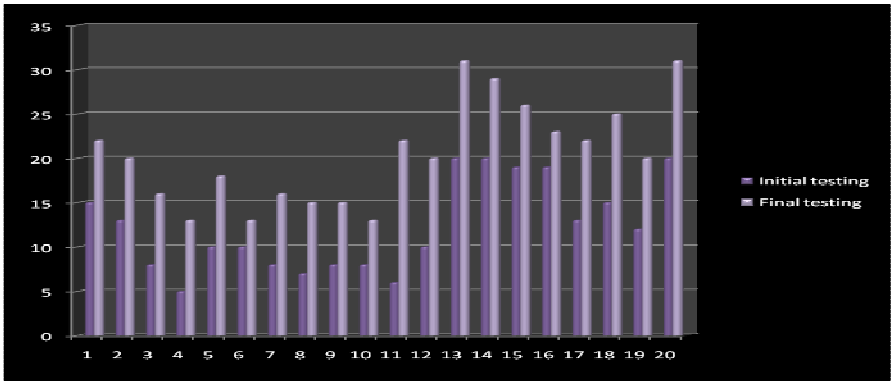
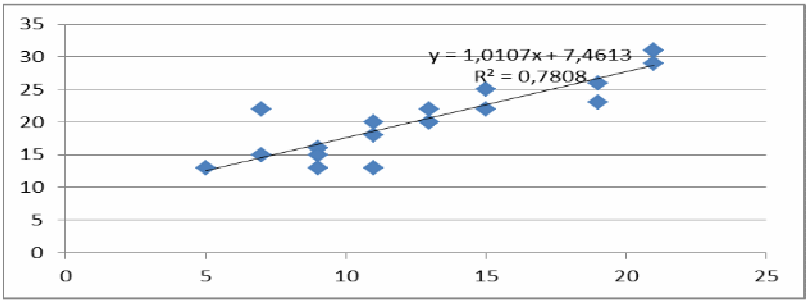


Fig. no. 1 The experimental group

From Graph no. 1, the line of the regression of the results recorded by the control group upon basketball hoop throwing can be noticed. The coefficient of determination R^2, which is the square value of the coefficient of regression R indicates the extent to which the line of regression approximates the cloud of points. It can be noticed that this coefficient of determination is significantly high (0,78) and the cloud of points from the Scatter type graph are distributed accordingly to the two vectors (initial testing and final testing), indicating a rising and linear positive distribution of the results.



Graph no. 1

In the case of the control group, one can notice a top score of 50 points, significantly more than the results recorded for the experimental group upon initial testing. Furthermore, in 7 cases a regression is recorded in the final testing as opposed to the initial testing; in 3 cases no progress can be noticed, while in 9 cases out of 20 some form of progress can be noticed.

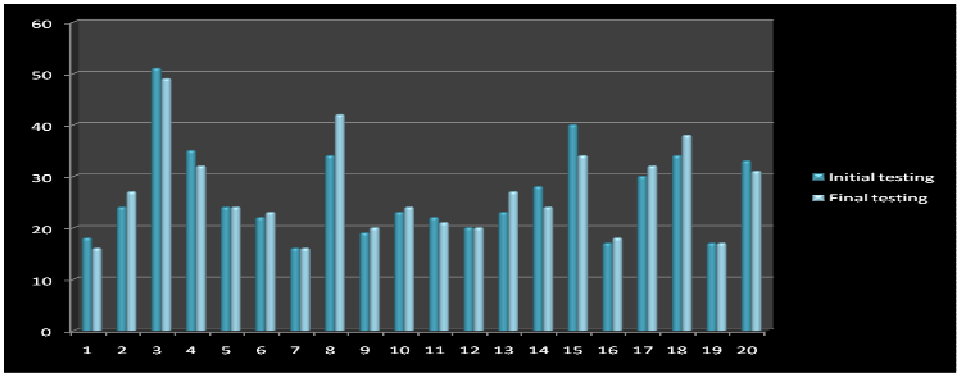
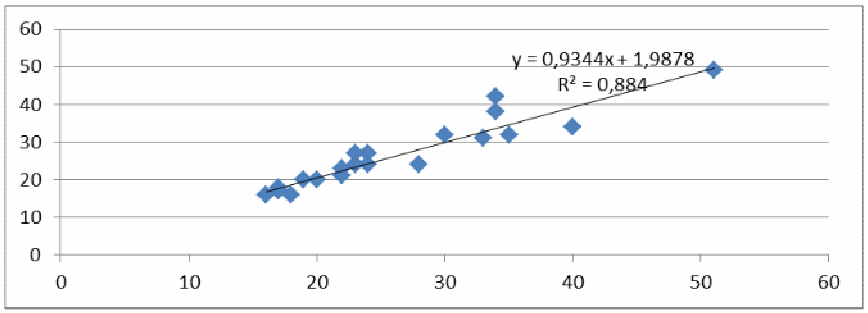


Fig. no. 5 Control group

From graph no. 2, one can notice that the line of regression of the results recorded by the control group in the case of target throwing. The coefficient of determination R^2, which is the square value of the coefficient of regression R indicates the extent to which the line of regression approximates the cloud of points. It can be noticed that this coefficient of determination is extremely high (0,884) and the cloud of points from the Scatter type graph are distributed accordingly to the two vectors (initial testing and final testing), indicating a rising and linear positive distribution of the results.



Graph no. 2

Following the test of significance, one can notice that in the case of the experimental lot there is a significant difference between the results recorded upon initial testing and those recorded upon final testing ($p<0,02$), which is due to specific work. In the case of the control group the difference between the mean values is not significant from a statistical point of view, as p has a higher value than 0,05.

A strong positive association can be noticed between the initial and final testing, both in the case of the control group and in the case of the experimental group.

Table no. 6

Group	X-Ti	X-Tf	SD-Ti	SD-Tf	Ttest	Pearson
Experimental	12,9	20,55	5,04	5,77	t=3,82, p<0,02	0,88**
Control	26,5	26,75	9,06	9,01	t=0,45, p>0,05	0,94**

4. Comparison of the correlations between the results from the initial testing and the IQ and between the results from the final testing and IQ, in the test of basketball hoop throwing

In the case of the experimental group, one can notice a lack of association between the pupils' IQs and the results recorded upon initial testing, and in the final testing a weak positive association is recorded. It can be noted that the IQ does not influence the development of specific motor skills.

Table no. 7

Group	IQ-Ti	IQ-Tf
Experimental	-0,01	0,17
Control	0,13	0,03

Neither upon initial testing, nor upon final testing, has an association been recorded.

Conclusions

In the case of pupils with mild mental impairment, the IQ does not influence the level of development of such a basic motor skill as throwing a ball at a target, nor a specific skill as hoop throwing.

In conclusion, following specific work, a significant progress of the specific motor skill is recorded in the case of pupils with mild mental impairments. This progress is not by happenstance. Still, the pupils' IQs does not condition the development of the skill in this case, but only determines the formation of the systems of action as a number of algorithms, the principle of small steps, doubling or tripling these steps by building the algorithms that follow the same objective, but which are different as a means of execution.

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