

## EFFICIENCY OF ACTIVE AND PASSIVE VERBALIZATION METHODS IN LEARNING MOTOR EXERCISES BY PRE-SCHOOL CHILDREN

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### Abstract:

Active and passive verbalization, as well as the standard method of motor learning of gymnastic floor exercises and compositions, was applied on three groups of pre-school children. Learning was practiced one hour a week for two months. On the basis of the results of canonical discriminant analysis of motor and gymnastic variables, it was confirmed that the active verbalization group had a significantly better success in learning than both the passive verbalization group and the control group of pre-school children. Also, the results showed, and the regression analysis confirmed, that the level of motor abilities did not affect the quality of learning gymnastic compositions.

**Key words:** verbalization methods, motor learning, pre-school age

### DIE WIRKUNG VON AKTIVEN UND PASSIVEN VERBALISIERUNGS METHODEN BEIM LERNEN MOTORISCHER ÜBUNGEN UNTER DEN VORSCHULKINDERN

#### Zusammenfassung:

Aktive und passive Verbalisierung, sowie die Standardmethode des motorischen Lernens bodengymnastischer Übungen und Kompositionen wurde auf drei Gruppen der Vorschulkinder angewandt. Zwei Monate lang hatten sie eine Lernstunde pro Woche. Auf Grund der Ergebnisse der kanonischen Diskriminanzanalyse motorischer und gymnastischer Variablen wurde es bestätigt, dass die Gruppe mit aktiver Verbalisierung bedeutend erfolgreicher beim Lernen war, als beide andere Gruppen: diejenige mit passiver Verbalisierung sowie, die Kontrollgruppe der Vorschulkinder. Die Ergebnisse zeigten und die Regressionsanalyse bestätigte es auch, dass der Grad motorischer Fähigkeiten keinen Einfluss auf die Qualität des Lernens gymnastischer Kompositionen hatte.

**Schlüsselwörter:** Verbalisierungsmethoden, motorisches Lernen, Vorschulalter

### Introduction

The kindergarten is the first institutional form of education in a child's life, where the learning of motor skills should be carried out under the control of experts (Arnheim and Pestolesi, 1973). At this age the basis of motor, psychological and health status of children is built, as well as the attitudes regarding regular physical education. The most important period of a human life for motor learning is between the age of three and the age of seven, because of the sensitive phases in the development of some motor abilities which occur at that age (Singer, 1972).

An important part in gymnastic activities

is the aspiration for graceful and correct performance. This aspect must be supported in the physical education of pre-school children, to begin with by using sport's attire, then a harmonious and expressive performance of exercises, and finally the performance of a gymnastic composition. In such a way, the learning of gymnastic exercises would improve the universal and harmonious development of a child's personality (Hamza, 1996).

The use of mental exercising during the learning of gymnastic exercises, helps in the learning of motions. Namely, during a mental presentation a child does not only imagine the necessary motions, but also all the reactions of the motions (ideomotor reactions). It is

assumed that the texts (lyrics), which are created in appropriate forms for the exercises and compositions and which are sung loudly (active verbalization) should be more efficient than listening to the same texts (lyrics) in a relaxed position from an audio tape (passive verbalization).

In this research it was assumed that physical exercising linked with active and passive verbalization, shortens the learning time and improves the quality of exercising, which is opposite to the learning based only on physical exercising (Hannaford, 1995). This is because of a better understanding of logical relations and emphasis on the main details in exercises and compositions during motor learning. The more senses we include in the learning process, the more efficient the results we can expect.

The issue of this research was to analyse the efficiency of active and passive method of verbalization during the learning process of gymnastic floor compositions with different complexities.

The basic purpose of this research was to enable a conscious and an active participation of pre-school children in the education process, using relatively new pedagogical methods and forms of teaching, which would make physical education in the kindergarten more efficient.

## Method

### The sample of subjects

The sample of subjects, 5-7 years of age, was selected from some kindergartens in Budapest (Hungary). The sample was divided into three groups: 1) the experimental group, which learned gymnastic exercises and compositions by the active verbalization method, and which consisted of 20 children; 2) experimental group, which learned gymnastic exercises and compositions by the passive verbalization method, and which consisted of 20 children; 3) control group, which learned the same exercises and compositions by the regular method (only by physical exercising), and which consisted of 40 children. In all the groups the proportion between girls and boys was 50:50 %

### The sample of gymnastic floor compositions and motor tests

Three short and one longer (24 units) gymnastic floor compositions were created. The first three compositions focused on the quality of performance and the fourth one on the speed of learning. The exercise and composition evaluations were performed according to a special code of points (in the range from 0 to 10 points) by three experienced gymnastic referees. The final result of the evaluated compositions for each child was the mean of the three scores given by the referees.

The first composition consists of the following exercises. From a rear stand: jump to a straddle position, with arms sideward; a forward lean (2s); a forward roll to a sitting position with legs stretched and arms behind the body; a "candle" (2s); rolling forward to a squat position; an upright stand and a scale position (2s), and a rear stand.

The second composition consists of the following exercises. From a rear stand: a squat position; a backward roll to the shins; jump to a squat position; stand up to a rear stand, arabesque (2s); a rear stand.

The third composition: from a rear stand, jump to a straddle position, with the arms sideward; a forward lean (2s); forward straddle rolling (the hands between the legs); jump up into a rear stand, arms circle backwards.

The fourth composition: from the first to the eighth unit, movements with arms and legs during the motions; from the ninth to the sixteenth unit, balance positions; from the seventeenth to the twenty-fourth unit, rhythm changes during exercising.

It was assumed that the motor abilities would influence the quality of performance and the duration of the memorized exercises and compositions in different ways. For this reason, the motor abilities were tested before the experiment according to a model which was established for the children, and according to the results obtained by Slein (Kobjakov, 1976). In this respect, the model manifestations of the following potential motor abilities were tested:

- 1) balance - by the vestibular stability test

- (Slemin-test) (cm),
- 2) explosive power - by the Sargent's test with a vertical jump (cm),
  - 3) flexibility - by pelvic girdle flexibility (degrees - 0),
  - 4) arms coordination - by the Slemin umbrella test 1 (degrees - 0),
  - 5) legs coordination - by the Slemin umbrella test 2 (degrees - 0) and
  - 6) general strength - by hand grip (N).

Description of the gymnastic compositions and techniques of motor test realization can be found in Hamza (1999). For this paper here are the short descriptions of the motor tests:

- 1) The vestibular stability test (Slemin-test). The child sat, blind-folded, in an arm-chair which was turned round six times, and then stood up and leant against a wall for 2s and walked 4m along a straight line. The result was the maximal difference between the walk line and the central line.
- 2) The Sargent's test with a vertical jump. The child jumped from a box and linked this jump with a vertical jump to reach as far up as he/she could on a scale (in cm) marked on the wall. The result was the difference between the jump-reach and the standing-reach of the child.
- 3) Pelvic girdle flexibility. The child stood with his/her back against the wall on which there were two 180 degrees goniometric scales and lifted the left or the right leg sideways. The result was an average of four performances expressed in degrees.
- 4) The Slemin umbrella test 1. The child stood facing a wall with two 30, 45, 90 and 135 degrees goniometric scales marked on it, and lifted his/her arms sideways up to every level. After that, the child stood with his/her back against the wall and lifted his/her arms sideways in the same memorized positions. The result was the sum of the differences in degrees.
- 5) The Slemin umbrella test 2. The child stood against the wall on which there was a 30-degree goniometric scale, and lifted

the left and right leg sideways. The result was the difference between the leg lifts and 30-degree positions.

- 6) Handgrip. The child gripped the child dynamometer with the left and right hand in the standing position. The result was the average between the grip of each hand.

### The learning methods of gymnastic exercises and compositions

The children who used the passive verbalization method, which consisted of learning the song with the text (lyrics) in order to memorize the exercises and compositions, listened to a tape with songs and descriptions of exercises and compositions in a relaxed position for 5 minutes before the end of a physical education class. The exercises for muscle contraction and relaxation were incorporated into a game in the main part of the session.

The active verbalization method consisted of the following: a song would be learned by heart and then the exercises and compositions were demonstrated. During the demonstration and performance of the whole gymnastic material, the children chanted the text (lyrics) linked to every detail of the exercise.

The children in the control group learned the gymnastic exercises and compositions in a regular way with a teacher's explanation and demonstration. After that the children started exercising.

The experiment was performed once a week, for two months, during the regular physical education classes for all three groups. The motor abilities were measured before and at the end of the experiment. At the end of the second month the three referees evaluated the performance of the exercises and compositions

### Data analysis

In order to determine the differences between the three groups of children in the motor variable space, as well as the

**Table 1.** Results of univariate analysis of variance of motor and gymnastic variables at the end of the experiment

VARIABLE	ACTIVE		PASSIVE		CONTROL		F	P
	AM	SD	AM	SD	AM	SD		
Vestibular stability (cm)	61.0	22.0	63.0	18.7	73.5	23.3	2.80	.07
Sargent's test (cm)	6.8	2.2	6.5	3.1	7.7	3.2	1.35	.27
Pelvic girdle flexibility ( $^{\circ}$ )	98.7	41.0	101.2	26.1	113.9	40.0	1.45	.24
Arms co-ordination ( $^{\circ}$ )	42.2	31.2	47.2	21.7	35.2	18.9	1.91	.15
Legs co-ordination ( $^{\circ}$ )	22.2	11.4	20.0	10.9	24.0	15.0	.61	.54
General strength (N)	63.0	15.6	55.0	13.9	63.7	15.0	2.46	.09
First gym. comp. (points)	8.4	.6	8.0	.5	7.6	.7	12.27	.00
Second gym. comp. (points)	8.7	.7	8.2	.5	7.9	.7	9.44	.00
Third gym. comp. (points)	8.6	.6	8.1	.6	8.0	.7	5.82	.00
Fourth gym. comp. (points)	17.3	7.5	22.5	7.2	23.6	6.9	5.25	.00

AM-arithmetic man, SD-standard deviation, F-F-test, P-level of significance

performance of the gymnastic compositions, univariate analysis of variance and canonical discriminant analysis were applied. In order to examine the significance of the influence of the analysed motor abilities on the performance success of gymnastic compositions after the two-month motor learning period regression analysis was used.

## Results and discussion

In learning the gymnastic exercises and compositions through the active and passive verbalization methods, a significant and positive influence of the children's motor abilities on the quality of performance and on the speed of learning these compositions could be expected. If that were correct, then this would rather decrease the value of the verbalization method effects. For that purpose, we used the analyses that took into account the interaction between the motor abilities and the achieved results in learning and performing the gymnastic compositions. It should be mentioned that in the initial testing of the motor abilities, no statistically significant differences between the three groups of children were found.

Table 1 gives the results of univariate analysis of variance of all the variables at the end of the experiment. The results showed that there were no statistically significant differences between the groups in any motor

variable. The best results in the performance of gymnastic compositions on the floor were in the group that learned the gymnastic exercises and compositions through the active verbalization method, then in the group that used the passive verbalization method. The children from the control group had the poorest results. Even these results pointed to a relative independence of the verbalization methods from the motor abilities of children.

The results of the canonical discriminant analysis, which consider the interactions of the entire variable space (Table 2), confirmed the previous findings. Only the first discriminant function was statistically significant ( $P=.00$ ). It explained about 80.5% of the differences between the three groups of children in the analysed variable space.

The discriminant factor (function) was defined by all four variables, which measured the quality and the speed of learning the floor exercises, and the variable that estimates vestibular stability. Based on such a structure, the factor could be defined as "The learning speed and performance exactness of a gymnastic composition on the floor". It is important to note that the structure was not defined significantly by other motor variables.

According to the position of the group centroids on the first discriminant factor, it could be concluded that the group which used the active verbalization method was significantly the most successful in the speed of learning and in the performance exactness

*Table 2: Results of canonical discriminant analysis of gymnastic and motor variables*

Function	$\lambda$	%	CR	Wilks' $\lambda$	$\chi^2$	P
1	.724	80.5	.65	.493	51.22	.00
2	.175	19.5	.39	.851	11.72	.23

VARIABLE	STRUCTURE
First gym. comp. (points)	-.66
Second gym. comp. (points)	-.57
Third gym. comp. (points)	-.42
Fourth gym. comp. (points)	.39
Vestibular stability (cm)	.31
Pelvic girdle flexibility ( $^{\circ}$ )	.22
General strength (N)	.11
Arms co-ordination ( $^{\circ}$ )	-.20
Sargent's test (cm)	.19
Legs co-ordination ( $^{\circ}$ )	.10

Group	Centroid
ACTIVE	-1.166
PASSIVE	-.418
CONTROL	.792

*Table 3: Influence of motor abilities on the quality and speed of learning gymnastic exercises and compositions*

VARIABLE	1 <sup>st</sup> compos.		2 <sup>nd</sup> compos.		3 <sup>rd</sup> compos.		4 <sup>th</sup> compos.	
	$\beta$	q	$\beta$	q	$\beta$	q	$\beta$	q
Vestibular stability (cm)	-.13	.31	-.31	.02	.11	.40	-.07	.56
Sargent's test (cm)	.11	.37	.20	.12	.14	.28	.06	.63
Pelvic girdle flexibility ( $^{\circ}$ )	.15	.19	.04	.75	.10	.42	-.13	.27
Arms co-ordination ( $^{\circ}$ )	.05	.72	.02	.88	.12	.32	.21	.08
Legs co-ordination ( $^{\circ}$ )	-.10	.47	.03	.82	-.07	.61	.19	.14
General strength (N)	-.17	.18	-.13	.31	.04	.76	.25	.05
P	.55		.23		.63		.18	

the gymnastic compositions on the floor. Less successful children were in the group that learned the gymnastic exercises and compositions through the passive verbalization method, and the least successful children were in the control group. It is very important to point out that there were no significant contributions by motor abilities to the structure of the first discriminant factor and that the motor abilities were rather homogenous in all the three groups of

children.

In order to solve the problem of influences of the motor abilities on the successful performance of gymnastic composition on the floor, four regression analyses were applied on the entire sample of children. The gymnastic compositions were the criterion variables and all the motor variables were the predictors. Table 3 presents the basic results of those analyses. There was no evidence of a statistically significant influence of the motor

abilities on the quality and the speed of the gymnastic exercises and composition learning.

According to the results in this research, it may be concluded that the applied active verbalization method produced better exercising on the floor than the passive verbalization method, and especially better than the control method. The effects of the verbalization methods on motor learning were relatively independent from the pre-school children's motor abilities.

According to the obtained results, it can be concluded that the applied active verbalization method of gymnastic exercise and composition learning showed the best results. It was proven that the children who

learned through active verbalization were aware of the tasks, which had a controlled and active influence on motor learning. The structure of every composition was determined by words (lyrics), in the order of exercises in the composition and in the rhythm of the performance. All this resulted in a much better execution technique. Using the active verbalization method, the correct motor performance of the exercises became better and firmer, and in an indirect way the mistakes were eliminated. The motor abilities of young children had no statistically significant influence on the performance of the gymnastic compositions on the floor.

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