

## **Evaluation of the effectiveness of a physical education program in terms of promoting preschoolers' motor performance, empathy and co-operation**

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**Abstract:** *The purpose of this study was to study the impact of an interventional physical education program with the aim of promoting the motor skills performance, empathy and collaboration skills. The sample of 76 preschoolers (N = 76 aged 60 ± 9 months) was divided into two equal groups (N = 38), the experimental and control group that attended the standard curriculum of the nursery school. The intervention had duration of six months and included mostly collaborative games, theatrical plays, etc. daily and for thirty minutes. To evaluate both initial and final tests for motor development, Mot-test was used and for the intercultural readiness, a preschoolers' behavioral observation scale was created. The scale was supplemented twice by the class kindergartener both before and after the physical education program. Exploratory factorial analysis was performed to investigate the structural validity of the behavioral observation scale. The "a-Cronbach" reliability test showed very large internal consistency of the questions of participation (0.91) and cooperation (0.93). The Kapa coefficient for agreeing estimates in nursery responses at double questionnaire delivery is 0.96 for empathy and 0.98 for co-operation, which shows a high-level agreement. T-test was performed to compare two samples of related and unrelated values. The results showed that the program positively influenced the promotion of both motor skills as well as empathy and co-operation among preschoolers. In conclusion, such surveys highlight the important role of physical education in improving motor skills performance, as well as the promotion of skills such as preschoolers' co-operation and empathy, which constitute structural social components of modern multicultural societies.*

**Key words:** *physical education, empathy, cooperation, intervention, preschoolers*

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### **I. Introduction**

Several surveys (Hellison, 2003; Nikopoulou, 2006; Kelly, 2011; Midthaugen, 2011; Ruokonen & Kairavuori, 2012; Derri, Kellis, Vernadakis, Albanidou & Kioumourtzoglou, 2014; Grimminger-Seidensticker & MohWald 2016) - in which physical education programs were created and implemented according to the principles of intercultural education in school age children - evaluated the impact of these programs on children's behavior and more specifically on cultural diversity.

The results of Midthaugen survey (2011) showed a significant reduction in the state of pupils' insecurity experiencing multicultural challenges and increased incidents of heterosexuality acceptance. As in the survey of Kelly (2011), the results outlined a positive impact of the intervention on enhancing students' self-esteem and self-understanding, regardless of their nationality and gender. It also seemed that the relationships between students have been improved, the irresponsible and offensive attitudes have been reduced, the recognition and acceptance of the others' success and their reward has been reinforced. It has been also noticed the reduction of selfish behaviors and the acceptance and help offer from and to the classmates as well as setting personal and group improvement goals.

The results of Derri, Kellis, Vernadakis, Albanidou & Kioumourtzoglou (2014) and Nikopoulou (2006) work showed that there was an improvement in interpersonal relationships, in the provision of assistance and cooperation regardless of the country of origin of elementary school pupils.

Ruokonen and Kairavuori, (2012) explored the levels of intercultural sensitivity displayed by students in the school context. The analysis of the results showed that 40% of the pupils were in the process of accepting, 25% at the adaptation stage and only 6% at the integration stage, with a small predominance of girls versus boys at the above stages.

On the other hand, the results of Grimminger-Seidensticker and MohWald (2016) research showed that there was no significant difference in student attitudes about cultural diversity following the implementation of the intervention program.

There are a number of researches dealing with the assessment of intercultural student readiness (Bhawuk & Brislin, 1992; Altshuler, Sussman, & Kachur, 2003; Fritz et al., 2005; Deardoff et al.) or physical educators (Grimminger, 2016) and other teachers' specialties (Simopoulos, 2014), but little effort regards younger age groups, and especially studies where physical education programs are being implemented to improve intercultural student readiness.

As Hellison (2003) mentions, through targeted physical education programs, responsibility, collaboration, rule-based play, active participation, peer support, appreciation of the opponent or the classmate can be cultivated.

Under the New Kindergarten Curriculum, the content of the physical education program is organized on the basis of three units. The first section aims at the targeted development of basic motor skills and the preschoolers' physical fitness. The second unit aims at acquiring knowledge regarding movement, health and motor concepts and the third unit at the development of self-expression and social interaction (Nursery School Program, 2011: 217).

Physical Education thus combining motor, social, cognitive and emotional processes (Gallahue, 2002: 9-12) is appropriate for promoting intercultural readiness as when people have to work together to complete projects based on the interdependence of the participants, emerges a new perception that motivates their performance as members of a group (Smith & Bond, 2011, 275).

Therefore, the contribution of this research is particularly important for the design and implementation of physical education programs aimed at improving the motor performance of children of early childhood, their co-operation, acceptance of diversity, empathy and respect regardless of national origin; or culture.

The school is called upon to address the problems of school and social inclusion for children of different social and cultural groups living in multicultural societies and thus to develop the appropriate school environment for the functional cohabitation and education of the native and foreign pupils. Such teaching interventions can help in this direction and should be applied to all levels of education since intercultural readiness is a lifelong, developmental process that is constantly evolving and there is no point where one can argue that it holds it to the highest degree (Barrett, Byram, Lazar, Mompoin-Gaillard & Philippou, 2013).

Also the bibliographic review highlighted the lack of similar studies in nursery school children. In the present study, an attempt was made to improve and evaluate specific capacities and attitudes of preschoolers that are structural elements of intercultural readiness. This tool could be the trigger for further research and an attempt to assess intercultural pre-preparedness by combining quantitative and qualitative methods to make it possible to assess further knowledge, attitudes and skills of early childhood children.

The purpose of this research is to evaluate the effectiveness of an intervention program with physical education activities aimed at promoting preschoolers' motor skills, empathy and co-operation skills. That is, to study the effects of the implementation of this intervention program on preschoolers.

### **Purpose and hypothesis of research**

Traditional games from Greece and other countries, as well as their variations, are suitable for the implementation of methods of physical education in kindergarten. Also, narrative and storytelling techniques and role playing in group physical education activities are suitable for early childhood as they support the smooth integration of the preschooler into the group and its socialization and develop its skills, evolving at this age (Zaragas, 2016: 107).

The assumptions of the investigation were therefore that:

- I. The intervention program will promote preschoolers' motor skills.
- II. The intervention program will promote the preschoolers' empathy and cooperation skills.

### **Sample of the survey**

The sample consisted of seventy-six children (38 boys, 38 girls, N = 76, 100.00%) aged 51-69 months from four public kindergartens in the city of Ioannina selected by random sampling. The control group consisted of 38 children (N = 38, 50%) who attended the kindergarten program, while the experimental group (N = 38, 50%) attended the intervention program designed specifically to meet the goals and requirements of research. All children of both groups were told about the factor of dealing with regular evening sports. Then those children were excluded, so neither in the experimental nor in the control group any child was involved in regular evening sports.

**Table I:** The sample of the research regarding gender, group (N= 76 100%)

		EXPERIMENTAL		CONTROL		TOTAL	
		f	%	f	%	f	%
GENDER	BOY	19	25	19	25	38	50
	GIRL	19	25	19	25	38	50
TOTAL		38	50	38	50	76	100

### Research tools

To measure the improvement of motor skills, it was used the kits of motor tests "MOT 4-6 (Motoriktest fur vier-bis sechsjahriges kind)" by Zimmer and Volkamer, 1987 ". The specific array, which has been used several times in the Greek research area too (Zaragas, 2016; Zaragas, 2013; Kambas, et al., 2012; Kostandelia & Tsapakidou, 2009; Kambas et al. 2005) constitutes of 18 motor tests which evaluate the kinetic performance of children aged 4-6 years. In accordance with the instructions of Zimmer and Volkamer (1987), kinetic tests evaluate agility and visual kinetic coordination, reaction speed, kinetic control, altitude capability representing the three movement skills in space, equilibrium (static and dynamic) and object manipulation.

With regard to the empathy and cooperation skills of preschoolers, these are complex concepts that include knowledge, attitudes and skills, are constantly evolving and influenced by various factors. Their attempt to evaluate them requires multiple measurements and reliable records of the action of the subjects (Barrett et al, 2013, p. 19). Also, their core development models and their assessment tools refer to adults or teenagers and use questionnaires, self-assessment scales of behavior and interviews that can hardly be used in nursery school children. For the purposes of this research and given the specific duration of the teaching intervention and the age of the sample individuals, two sub-scales were created to record the frequency of occurrence of specific pupils' behaviors addressed to the nursery teachers and evaluate the components of empathy and co-operation, according to the bibliographic review (Chen & Starosta, 1997; Chen & Starosta, 1997; Pantazis, 2004; Deardoff, 2010; Barrett et al, 2013; Chen & Starosta, 1997). Specifically, through observing the behavior of early childhood children, an attempt was made to assess the skills of empathy and collaboration.

### Statistical analysis

The reliability of the questionnaire for the skills of empathy and collaboration was found to be in all of the 13 questions  $\alpha$ -Cronbach = 0.979, which shows the very high degree of internal questionnaire's consistency for what it is just researching.

Inter-external reliability is given by the Kappa coefficient and is basically a measure of the agreement between the estimates of two different estimators (the researcher's and the kindergartener's of the department). The Kappa coefficient for the agreement of the estimates of the two (class researcher and kindergartener) is: a) 0.993 for motor skills in the initial and 0.095 in the final test; b) 0.982 in the initial and 0.981 in the final test for the co-operation ability and c) 0.966 in the initial and 0.978 in the final test for the ability of cooperation, which shows a high level agreement between the evaluators in all four cases.

**Table II:** Indicator of reliability « $\alpha$ -Cronbach» and reliability coefficient between estimators of the research variables

MEASUREMENT TOOLS	N	Indicator Reliability $\alpha$ - Cronbach's	of Kappa Coefficient	
			Before	After
<b>Motor Performance</b> MOT – test / 4-7 (Zimmer & Volkamer, 1987)	18	,989	,993	,995
<b>Social Abilities</b> COOPERATION	6	,978	,982	,981
EMPATHY	7	,963	,966	,978

A confirmatory analysis of key component factors was made for the correlations of the 13 questions - variables. Firstly, factors with two factors with roots equal to or greater than 1.00 were exported. The rectangular rotation of the factors gave the structure shown in Table III. The first factor (co-operation) is responsible for 47.50% of the fluctuation; the second (empathy) is responsible for 44.00% of the fluctuation. The first factor seems to be the cooperation and the second one the empathy.

The results were subjected to an unrelated control t "Independent Samples t-test", which is used to compare two samples of unrelated / non relevant values' if the averages of two sets of values differ considerably from one another, ie if the mean percentages of the two experimental and control groups differ in both initial and final measurements for the dependent variables of this research (kinetic performance of skills, social skills: cooperation and empathy).

For the statistical analysis of the data the SPSS 22 PASW statistical program of the University of Ioannina was used.

### Results of the survey

According to the kinetic performance score and the frequency of occurrence, the children were classified at different levels: very good, good, normal-regular, under normal and with obvious kinetic difficulties, as shown in Table III, both before the intervention and after its completion.

Before the intervention the children of the experimental team are classified as follows:

- a) 7 children (18.4%) in the under-normal,
- (b) 18 children (47.4%) in normal, and

c) 13 children (34.2%) in the good level of kinetic performance. Accordingly, the children of the control group before the intervention are classified as follows:

- (a) 6 children (15.8%) in the under normal,
- (b) 20 children (52.6%) in normal, and
- c) 12 children (31.6%) in the good level of kinetic performance.

After the intervention the children of the experimental team are classified as follows:

- a) 7 children (18.4%) in the under-normal,
- b) 23 children (60.5%) in the good, and
- c) 8 children (21.1%) in very good level of kinetic performance. Accordingly, the children of the control group in the post intervention level are classified as follows:
- a) 4 children (10.5%) in the under - normal,
- (b) 22 children (57.9%) in normal, and
- c) 12 children (31.6%) in the good level of kinetic performance.

The fact that both teams showed improved kinetic performance at the end of the intervention period with the experimental one appearing statistically significantly better than the control group (as will be seen below, see table "IV") is related to the fact that the control team had also been engaged in a sufficient number of mobility stimuli by following the formal curriculum of the kindergarten.

Table "IV" refers to the characteristics of descriptive statistics (mean, standard deviation, maximum and minimum) of both the experimental and control groups in the initial and final measurement in the kinetic test set (MOT). It seems that the experimental team achieves better scores than the control group in the final measurement. Because there were differences in the averages of the experimental and control groups in both initial and final measurement in all kinetic assays, the results were subjected to an unrelated "Independent Samples t-test" test.

The non relevant control "Independent Samples t-test" for the comparison of two samples of unrelated / non relevant values "is used to calculate whether the averages of two sets of values differ significantly from one another, ie if the averages of the experimental and control groups differ in both initial and final measurements for the dependent variables of this research (kinetic performance, collaboration and empathy).

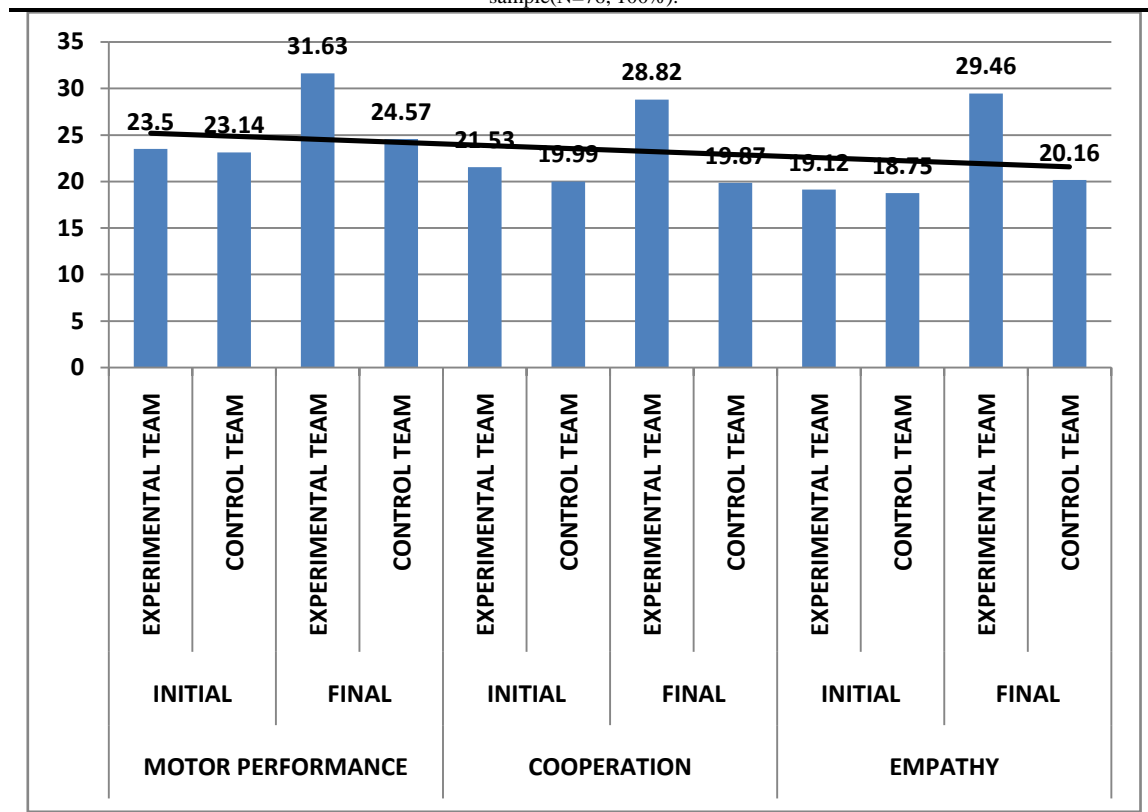
**Table III:** classification of the kinetic development scores (MOT test) obtained by the sample children in the total sums of the initial and final measurement for both the experimental and the control groups (N=15, 100,00%).

CLASSIFICATION	INITIAL MEASUREMENT				FINAL MEASUREMENT			
	Experimental		Control		Experimental		Control	
	f	%	f	%	f	%	f	%
Very well					8	21,1		
Well	13	34,2	12	31,6	23	60,5	12	31,6
Normal	18	47,4	20	52,6	7	18,4	22	57,9
Under normal	7	18,4	6	15,8			4	10,5
Motor difficulties								
<b>TOTAL</b>	<b>38</b>	<b>100</b>	<b>38</b>	<b>100</b>	<b>38</b>	<b>100</b>	<b>38</b>	<b>100</b>

**Table IV:** statistically descriptive for the motor performance, the social abilities of cooperation and empathy for the total of the sample N=76, 100,00%.

VARIABLES	MEASUREMENTS	GROUP	N	Mean	Std. Dev.
<b>MOTOR PERFORMANCE</b> Total sum of the tests of Mot – test (4-7)	Initial	Experimental	38	23,50	4,84
		Control	38	23,14	6,67
	Final	Experimental	38	31,63	3,11
		Control	38	24,57	5,88
<b>COOPERATION</b> Total sum of the answers for cooperation	Initial	Experimental	38	21,53	3,63
		Control	38	19,99	5,64
	Final	Experimental	38	28,82	2,36
		Control	38	19,87	3,69
<b>EMPATHY</b> Total sum of the answers for cooperation	Initial	Experimental	38	19,12	5,49
		Control	38	18,75	6,41
	Final	Experimental	38	29,46	4,65
		Control	38	20,16	4,58

**Graphic depiction I:** of the mean percentages for the total sums of the variables in the initial and final measurements of the sample(N=76, 100%).



**Results for kinetic performance**

The mean for the initial total sum of the 18 kinetic test assays of the experimental group (mean = 23.50 Std. Dev = 4.84 see Table "IV") is not significantly higher than that of the group ( $t = 0.345, df = 13, p_{TWO-TAILED} = 0, 276 > 0.05$  see table "V") ), Which shows that the two groups at the beginning of the intervention do not have significant differences in motor development, and this further strengthens the results of the present investigation after the intervention, thus giving a large degree of internal curvature in research into motor skill performance.

The average for the final total sum of the 18 kinetic performance tests of the experimental group (Mean = 31.63 Std.Dev. = 3.11 see Table IV) is significantly higher than that of the control group ( $t = 2,103, df = 13, p_{TWO-TAILED} = 0.023 < 0.05$  see table "V"). ), indicating that the two groups at the end of the intervention have statistically significant differences in motor development, a fact that shows that the intervention for the experimental group was successful because the experiment had better results, higher prices.

**TABLE V:** Control «Independent Samples t –test » for the comparison of the results between the experimental and the control group in both the initial before and in the final values , after the intervention for the dependent variables of the research, the motor performance, the cooperation and empathy for the total of the sample N=76, 100,00%.

VARIABLES	MEASUREMENTS	F	t	df	p <sub>two-tailed</sub>
MOTOR PERFORMANCE	Initial	0,813	0,345	9	0,276
	Final	5,167	2,103	9	0,023
COOPERATION	Initial	0,333	0,415	9	0,121
	Final	5,116	7,690	9	0,001
EMPATHY	Initial	0,767	0,434	9	0,156
	Final	4,897	7,347	9	0,001

**Results for the social capability of cooperation**

The average for the initial measurement (initial sum of the six questions) of the experimental group collaboration (Mean = 21.53 Std. Dev. = 3.63 see table "IV") is not statistically significantly higher than ( $t = 0.415 df = 9 p_{TWO-TAILED} = 0.121 > 0.05$  see table "V"). The results of this study are shown in Table 1 below. V), indicating that the two groups at the beginning of the intervention do not have significant differences in the social ability of working with the experimental group to achieve a higher average than the control group in the initial trials as this shows a statistically significant difference.

The average for the final measurement (final sum of the six questions) of the collaboration for the experimental group (Mean = 28.82 Std.Dev. = 2.36 see Table "IV") is statistically significantly higher than ( $t = 5.116$ ,  $df = 9$ ,  $p_{TWO-TAILED} = 0.001 < 0.05$  see table "V"), and that of the control group (Mean = 19.87 Std. Dev. = 3.69 see tables "IV " V " ), which shows that the two groups at the end of the intervention have significant differences in the social ability of working with the experimental group to achieve a higher average than the control group in the final tests.

Results on the intercultural capacity of empathy

The mean for the initial sum of the seven questions of empathy for the experimental group (Mean = 19.12 Std.Dev. = 5.49 see Table "IV") is not statistically significantly higher than that of the control group (Mean = 18, 75 Std. Dev. = 6,41 see table "IV") because ( $t = 0.776$ ,  $df = 9$ ,  $p_{TWO-TAILED} = 0.056 > 0.05$  see table "V"), indicating that the two groups at the beginning of the intervention did not have statistically significant differences in empathy with the experimental group achieving a higher mean than the control group in the initial tests but not a statistically significant difference.

The mean for the final sum of the seven questions of empathy for the experimental group (Mean = 29.46 Std.Dev. = 4.65 see Table "IV") is statistically significantly higher than that of the control group ( $t = 4.897$ ,  $df = 9$ ,  $p_{TWO-TAILED} = 0.001 < 0.05$  see table "V"), indicating that the two groups at the end of the intervention have statistically significant differences in the social ability of empathy with the experimental group achieving a higher average than the control group in the final tests.

## **II. Conclusions, discussion**

The statistical analysis of the results showed that the experimental group, which attended the six-month interventional physical education program, including co-operative games, storytelling , play-drama techniques and educational drama, showed an improvement in motor skills significantly greater than that of the control group . These results are consistent with those of corresponding studies that investigated the effect of interventional physical education programs on children (Kampa, Amouzas, Makri, Gourgoulis, Antoniou, 2002; Pollatou, 2003; Campas, Gourgoulis, Fatouros, Aggelousis, Proviadaki & Taxildaris, , 2008, Zimmer, Christoforidis, Xanthi, Aggeloussis & Kambas, 2008; Spanakis, Skordilis, Venetsanou, 2010; Kambas, Fatouros, Christoforidis, Venetsanou, Papageorgiou, Giannakidou & Aggeloussis, and it seemed that the experimental group is significantly improved in comparison to the control group.

Also, as Deardorff (2009) reports, some programs took up to 2 years to design the goals and objectives of implementing an integrated assessment plan of intercultural preparedness. Programs and tools for collecting both qualitative and quantitative data for adults, students or teenagers. The duration of the specific teaching intervention (six months) and the age of the sample children were two other important limitations.

A comprehensive study of the social skills of empathy and co-operation includes an integral set of knowledge, attitudes and skills that enable individuals to recognize, feel, accept and respect each other (Grimminger-Seidensticker, & Mohwald, 2016) integrate creatively the various elements by eliminating their prejudices, adapt past opinions and attitudes, and acquire new behaviors and styles of interaction, aiming at effective and appropriate communication with the whole of people that keep in touch with each other daily and the ability of moving from one frame of reference to another and mediation between different perspectives (Borghetti, 2012; Byram, 1997; Fantini, 2009; Hammer, 2015; Magos & Simopoulos, 2010). The social skills of empathy and cooperation are necessary for everyone, for everyday life and for school, education.

Starting with the above in the present study, an attempt was made to assess specific qualifications that, as evidenced by the bibliographic review, are substantial components of the social interaction in kindergarten. A scale was created to record the incidence of the pupils' specific behaviors, addressed to the kindergarteners and assesses the skills of cooperation and empathy. The statistical analysis showed that the experimental group after the implementation of the didactic intervention showed significantly better results in the motor performance of skills and specific social abilities compared to those of the control group, which attended the formal curriculum of the kindergarten.

According to Slavin & Cooper (1999), through group collaboration, students with different national and racial backgrounds are more likely to build positive relationships, reduce racial discrimination, stereotypes and prejudices, and therefore put the foundations for the improvement of their interpersonal relationships and improving their cooperation.

According to Chepyator-Thomson (1994), Physical Education, due to its dynamic influence on social determinants, can help to reduce national discrimination and promote intercultural understanding. It can promote wider appreciation and understanding of the peculiarities of different cultural groups and lead to the achievement of good interpersonal communication (Sparks, 1994), inside and outside the school environment.

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