Physical Education and Language Integration: Effects on Oral and Written Speech of Pre-school Children

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Abstract

The aim of this study was to examine the effect of the integration of physical education and language on oral and written speech of preschool children. Sixty seven preschool children (34 girls and 33 boys), ages 4 to 6, were randomly divided into two groups. Group A participated at a 5-week movement and language program in the gym while Group B participated at the same program, in class, without the movement integration. The programs were applied four times per week for forty minutes each time during the typical school program. A knowledge test with 19 tasks/criteria was constructed for the pre-, post-, and retention test measurement of children's oral and written speech. Analysis of covariance was used for data analysis. Results revealed that children of Group A outperformed those of Group B both in the post-test and the retention test, while controlling for the effects of the pre-test scores. These findings show that an integrated physical education program may assist in the development of language skills of preschool children.

A rather old educational process seems to gain momentum worldwide, and is being suggested as an interesting alternative or even as a complete proposal for teaching. "Integrated", "cross-disciplinary", "interdisciplinary", and "multidisciplinary teaching" are among the terms which have been used to describe this process. Cone, Werner, Cone and Woods (1998) defined interdisciplinary teaching as "an educational process in which two or more subjects are integrated aiming to enhance learning in each subject area".

Physical education plays a crucial role in the development of the motor, cognitive and affective domain during childhood (Pica & Short, 1999). This is a result of integrating physical education goals or contents (internal integration) or of integrating its goals or contents to those of other subject areas (external integration) within school curriculum; that is to use movement to teach academic content (Cone et al., 1998).

Teaching language is an important part of the early childhood school curriculum with clearly set goals regarding the development of oral and written speech. According to the Hellenic Interdisciplinary Common Framework of Studies for the Kindergarten (HICFSK, Ministry of National Education and Religious Affairs, 2002), teachers can assist children to achieve the above goals through the integration of language activities with mathematics, study of the natural environment, creativity and expression (art, drama, music, physical education), as well as computer science. The development of oral speech takes place through different activities such as narration, story telling, description, use of metaphors, reproduction of verbal representations or schemas, and word recognition within both the natural environment and texts. The development of written speech is being achieved through activities which aim to familiarize kids with letters and words. Children are supported in their attempt to write their names, to copy words from reference cards, and generally to write according to their ability. Similar goals and activities for language development have been set by other countries as well (e.g., QCA & DfEE, 2000; Bulletin Officiel du Ministere de l' Education Nationale et du

Ministere de la Recherche, 2002; Ministere de la Communaute francaise de Belgique, 2002; Ireland, 1999).

The relationship between physical education and language has been also confirmed by the viewpoint, that problems in speech are many times connected with motor difficulties and vice-versa (Smith, 1989; Visscher, Houwen, Scherder, Moolenaar & Hartman, 2007). For this reason, the importance of the use of intervention programs that address both cognitive and motor subject areas has been stressed (Smith, 1989; Visscher, Houwen, Scherder, Moolenaar & Hartman, 2007). It has also been documented that the incorporation of language strategies to a movement program promotes and enhances linguistic concepts while at the same time addresses the movement needs of young children (Connor-Kuntz & Dummer, 1996).

A possible explanation for the aforementioned relationship may be the fact that movement and language are two natural and powerful ways of expression and communication that develop in a similar way. Regarding language, students first learn to identify the letters of the alphabet, to arrange them into words, and then to form meaningful sentences. Similarly, regarding physical education, students first learn the movement alphabet that consists of verbs or movement skills (e.g., I will run), and adverbs or movement concepts that modify the movement skills (e.g., I will run slowly), before successfully participating in more complex activities such as sports dance and gymnastics (Buschner, 1994).

Undoubtedly, movement activities motivate children, capture their attention, and improve their critical thinking and problem solving skills. Children also have the opportunity to recite, discuss, and explain verbally the cues or the rules of activities and games, and to combine written expression with movement activities, thus boosting their development in both language and physical education. For instance, children can shape letters and form words with their bodies and later write them down. It has also been shown that it is pleasant for children to copy words or rules for different activities (Humphrey, 1990).

Additional support for interdisciplinary programs with movement orientation is based on the fact that movement assists: a) the formation of intellectual presentations (Hieldebrand, 1991), b) the development of cognition and language skills (Katz, 1990), and c) the overall learning process, since the interaction between child and content is considered more complete (Fielden, 1995; Jehue & Carlisle, 2000; Werner & Burton, 1979). Finally, movement connects learning experiences to everyday life, by relating and reconstructing new and previous knowledge (Garcia et al., 1996; Kalyn, 2005).

Researchers have confirmed the positive influence of movement activities and have supported their use as an inseparable part of teaching various topics such as mathematics and/or language in kindergarten and primary school (Werner, 1996). Activities that integrate physical education in mathematics and writing (Banister & Harlow, 1997; Unsick, Johnson & White, 2003), art and language, social studies, and foreign languages (Barton, Kirby, Nazario & Brooks, 2000) have been reported.

Relative studies have been mostly based on teachers' and researchers' reports and experiences (Lake, 1994; Lipson, Valencia, Wixson & Peters, 1993; Pica & Short, 1999), on theoretical or practical proposals (Barton et al., 2000; Tsapakidou, Zachopoulou & Samara, 2001), or on ways to implement interdisciplinary programs (Winker, 1998). Few of them have evaluated the effectiveness of actual programs on knowledge enhancement and learning (e.g., Lake, 1994; Werner, 1999; Zervou, Derri & Paterakis, 2004). Therefore, there seems to be little scientific evidence regarding the effectiveness of an interdisciplinary movement program on language learning.

To describe and analyze the effect of an integrated movement program on language skills acquisition and learning, the following questions were posed as a framework for the current study: 1) would an integrated physical education and

language program affect oral and written language skills acquisition and retention of preschool children and, 2) would such a program be more effective than an integrated in-class program? Therefore, the aim of this study was to examine the effect of physical education and language integration on oral and written speech of preschool children. The hypothesis was that the integrated movement program would be more effective than the integrated in-class program.

Method

Participants

Sixty seven kindergarten students (34 girls and 33 boys) from Northern Greece, ages 4 to 6 (M=5.8, SD=0.4) participated in the present study. Two schools were randomly selected, and children of each school were randomly assigned into two groups. All participants were enrolled in the all-day kindergarten setting. Group A participated at a 5-week movement and language program in the gym while Group B participated at the same program, in class, without the movement integration. Following information regarding the scope of the research, parents gave their consent for participation.

Measures

A specially designed test was constructed for the evaluation of children's oral and written speech. The test included 19 tasks/criteria that were given to all children in the same order. For its construction, the HICFSK (Ministry of National Education and Religious Affairs, 2002) was taken under consideration. According to the above framework, teaching language focuses: a) on the improvement of oral communication as well as on the enrichment of oral speech, b) on reading and c) on writing. Other researchers have also supported that language skills can be enhanced during early childhood through organized activities that are related to the development of oral speech and vocabulary, to the knowledge of the letters, and to written-speech skills (Clay, 2000; McGee & Richgels, 2000; Miller, 1998; Morrow, 2001).

More specifically, the above test was designed to assess language skills with topics associated both with physical education and everyday life. Its topics were related a) to movement concepts such as "body awareness" (e.g. knowledge of the parts of the body and their movement), "space awareness" (e.g. forth and back, left and right), "effort concepts" (e.g. quickly-slowly), "relationship concepts" (e.g. individual movement, movement with partner/s or with an instrument), and b) to movement skills such as "non locomotor skills" (e.g. balance, support), "locomotor skills" (e.g. walking, running etc.), "manipulative skills" (e.g. throw, catch, kick) as well as to combinations of the above.

The test consisted of tasks/criteria where children could add concepts, letters, words, opposites as well as of questions regarding the language content of movement skills and concepts. The questions were structured in such a way that children could answer with verbs, nouns, adjectives, adverbs and sentences. The criteria for oral and written speech are described below. The test had logical validity. Its reliability was examined with a test-retest measure (ICC = .83).

Oral speech. The evaluation of oral speech included 10 criteria. Children were asked to define movement skills using corresponding images, to make sentences using movement concepts, to find antonyms, verbs, adjectives, and adverbs, in relation to movement vocabulary. Children's responses to these tasks were noted by the teacher/member of the research group.

Written speech. The evaluation of written speech was based on nine tasks/criteria which required children to fill in or to copy the correct word, to circle capital and small letters, and to fill in words. Children's attempts were supported by corresponding reference cards with relevant words/cues. In this case, children could identify and copy the letters or words from the cards in order to complete the written part of the test.

Procedure

A pilot study was conducted with 20 preschool students of the same region (10 boys and 10 girls, ages 4 to 6), in order to identify any possible problems with the application of the knowledge test. Since no problems were revealed during the pilot study, the pre-test assessment was applied. Similarly, a post-test session took place right after the completion of the program. Finally, a retention test was performed two weeks after the post-test session. Assessment sessions included two parts. The first part included oral-speech assessment, while during the second part written-speech assessment was performed. Data collection took place individually with the parallel use of material (cards with words, pictures and work sheets). The total time of testing was approximately 45 minutes for each child. The child's progress was recorded on a testing protocol created for that purpose.

The programs

Both programs were applied during the regular school program. The teaching units for both groups included: (1) movement concepts, (2) non locomotor skills, (3) locomotor skills, (4) manipulative skills, (5) non locomotor skills and movement concepts, (6) locomotor skills and movement concepts, (7) manipulative skills and movement concepts, and (8) a combination of fundamental skills and movement concepts.

For Group A, the purpose of the above units was practice in using words and expressions related to movement concepts and skills. For instance, in order to learn the parts of their body in combination with non locomotor skill concepts, children had to balance on parts of their body specified and named by the teacher. Following that, children had to describe orally the performed movement (e.g. "I balance on the right side of my body with my elbow and my toes"). The same activity, regarding written speech, included lists with the body parts that the children had balanced on. The lists were read by the teacher and then by the children. Then the children wrote capital and small letters or copied words from the reference cards, and finally, they tried to write down their actions. In that way children tried to achieve the goals set by the HICFSK (Ministry of National Education and Religious Affairs, 2002).

It was of great importance for the children to use verbs, nouns, adjectives and adverbs, to recognize words and letters, and to use words related to physical education (e.g. "he is running fast") as well as to their every day life (e.g. "time is running fast"). At the end of each lesson, a two to three-minute evaluation followed regarding the content of activities. For instance, children were required to fill in the missing words (e.g. "the acrobat …… upon a wheel").

The first week aimed at the development of fundamental non locomotor (balance-support), and locomotor skills (walking, running, jumping etc.). Another important goal during the same period was for the children to learn the corresponding vocabulary (walk-walking, run-running, etc.) through the use of oral speech and through the reference cards (vocabulary lists of various themes).

Activities of the second week also aimed at the development of fundamental locomotor skills and concepts (moving at different directions, forth, back, aside, etc- in different ways- running, walking, galloping, crawling etc). At the same time these activities aimed at the comprehension of concepts such as wide-narrow, short- long, strongly-lightly, quickly-slowly, near-far etc.

During the third week, the activities aimed at the development of manipulative skills (ball roll, throw, kick, etc). A simultaneous goal was for the children to learn the corresponding vocabulary (throwing, catching, rolling, kicking, etc) and how to use it during every-day talking (e.g. throwing litter, guests reception etc).

The activities of the fourth week referred to the development of non locomotor and locomotor skills along with movement concepts of space and relationships. In regard to language, children practiced opposite words basically by forming

short sentences with adjectives and adverbs. They dictated these sentences to their teacher who wrote them down in order for children to read them (shared writing).

Finally, during the fifth week the activities included combinations of locomotor and manipulative skills with the movement concepts of effort (e.g. fast, slow) and relationship (e.g. lead-follow). The language goal included the creation of short stories and the use of the acquired vocabulary.

Regarding Group B, the program included exactly the same language activities for comprehension and development of movement skills and concepts but without movement integration. For instance, "throwing" and "jumping" were introduced through cards which included pictures as well as the corresponding words. These cards were presented to children in order to understand the skills and learn the corresponding vocabulary. Accordingly, regarding the skill of "crawling", children who attended the in-class program had to repeat the sentence "to crawl, to crawl...like a snake" but the words were not converted to movement.

Results

Means and standards deviations of both groups in all measures are presented in Table 1.

Table 1. Scores of both groups in all measures.

	Pre-test				Post-test				Retention test			
	Group A		Group B		Group A		Group B		Group A		Group B	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Oral speech	21.25	6.36	29.63	7.28	36.7	6.45	32.13	6.78	37.29	6.43	29.13	4.76
Written speech	16.54	5.49	19.22	4.31	20.96	2.96	20.55	3.69	20.38	3.52	20.38	3.65
Total score	37.80	11.1	48.86	9.94	57.67	8.49	52.69	9.59	57.67	8.17	49.52	7.16

Univariate analysis of variance 2X3 revealed significant differences between the two groups on the pre-test scores including oral speech ($F_{(1,65)} = 24.75$, $p < .001$), written speech ($F_{(1,65)} = 4.5$, $p < .001$), and total score ($F_{(1,65)} = 18.47$, $p < .001$). Participants of Group A exhibited significantly higher scores than those of group B (Table 1). For this reason, analysis of covariance was applied to test for possible differences between the two groups in the post-test and in the retention test, while controlling for the effects of the pre-test scores. Data analysis showed statistically significant differences between the two groups in a) post-test ($F_{(1,64)} = 50.21$, $p < .001$) and in retention test for oral speech ($F_{(1,64)} = 96.68$, $p<.001$), b) in post-test ($F_{(1,64)} = 4.53$, $p < .05$) and in retention test ($F_{(1,64)} = 2.46$, $p < .05$) for written speech and c) in post-test ($F_{(1,64)} = 44.50$, $p < .001$) and in retention test ($F_{(1,64)} = 74.18$, $p < .001$) for the total score, all in favour of Group A.

Discussion

There are differences in teaching preschoolers than older students due to differences in interests and abilities. Every child is born with the desire to move, play, enjoy and learn. Although children's desire for motion is common knowledge, especially for younger ones, the educational system and parents seem to disagree. They support the notion

that children become better learners when they are seated and pay full attention to the teacher (Hynes- Dusel, 2002). In contrast, according to a contemporary approach, the natural setting of language is movement, since it provides experiences that help children develop intellectual representations (Hieldebrant, 1991). It has been supported that through integrated movement programs children learn in a holistic way (Siegel, 1997) and become more active (Werner & Burton, 1979).

In the present research an attempt was made to examine the effect of the integration of physical education and language on oral- and written-speech development of preschool children. According to the findings, an integrated movement program seems to have better results on the development of children's oral and written speech. Specifically, children who attended the integrated physical education program exhibited better performance during both post- and retention test regarding oral speech, compared to the children who were enrolled in the same program, in class, without movement integration. For example, most of the Group-A students answered correctly to the questions that demanded a noun as an answer, as for instance in questions related to knowledge about movement skills (e.g. running). On the contrary, Group-B children, instead of a noun they used a verb to define the skill (e.g. run), while they did not answer the respective question regarding the skill of "throwing". In another question, children had to recognize the respective words/skills (e.g. kicking-jumping-support). Group-A children made progress by recognizing the corresponding word, while only few of their Group-B mates understood how to respond, despite their efforts. Moreover, regarding one of the oral-speech questions, children were given two words (e.g. jumping- walking) and were asked to create sentences. During both post- and retention tests, although children of Group A had understood the process of creating sentences, they used correctly a noun but turned the other word into a verb (e.g. "the athlete made a huge jump and my grandmother finds it difficult to walk"). Overall, Group-A children's answers revealed creativity and originality, especially when they used adjectives, adverbs as well as when they created sentences and stories. The use of movement activities has also been previously supported to enrich children's vocabulary (Lipson et al., 1993), to teach movement concepts (Winker, 1998), foreign languages (Barton et al., 2000) or language skills (Pica & Short, 1999) to pre-school children.

Movement is also considered as a means to enhance and cultivate children's expression in writing. Researchers have found that this was the case when teachers combined writing and movement in teaching deaf children (Block & Campbell, 2001). Children were encouraged to combine words using the skill of writing, and then translate them into motion, creating their own movements (Block & Campbell, 2001).

In the present study, regarding the development of written speech Group-A children exhibited better scores during post- and retention test compared to their Group-B mates. Therefore, it seems that the hypothesis that the integrated movement program would be more effective than the in class one was supported.

Despite the fact that the learning subject of the present research differs from those of other relevant studies, the findings coincide with the respective results that support the positive influence of integrated movement programs on academic knowledge (Schnirring, 1999; Werner, 1996; 1999; Winker 1998; Zervou et al., 2004). This is probably due to the fact that motion encourages children and increases their interest towards learning. Active learning also helps students of lower ability to improve their knowledge (Rausechenbach, 1996; Schnirring, 1999; Werner, 1996). The aforementioned effectiveness of integrated movement proposals has been repeatedly supported (Barton et al., 2000; Lipson et al., 1993; Pica & Short, 1999; Tsapakidou et al., 2001; Winker, 1998). Furthermore, according to Conor-Kunz and Dummer

(1996), the combination of language concepts and movement activities helps children enrich their vocabulary and satisfy their motor needs. It seems that this approach gives meaning to the abstract academic knowledge and can be used alternatively when the goal is to teach academic skills in a pleasant and creative way. Considering that in the present study the interdisciplinary approach involved kindergarten students, any conclusions should be taken into consideration for language learning at this level.

In general, methods of teaching such as the interdisciplinary approach should be an inseparable part of the educational process. The teacher's role should be instructive, coordinative, advisory, and motivating. Moreover, the teacher should also assist students to collect information, identify possible problems, find solutions and express opinions (Chrisaphidis, 1996). The interdisciplinary approach is the basis of the new Hellenic school curriculum, and teachers are responsible for implementing the proposed programs. Imagination and creativity seem to be enough for simple integrated activities. However, careful and collective planning is required for the elaboration of interdisciplinary programs (Rauschenbach, 1996). Therefore, teachers should be encouraged and supported through seminars and continuing education programs that will provide them with all the necessary knowledge for structuring and implementing such types of programs.

Conclusively, the current study seems to support the use of movement through the interdisciplinary approach in teaching. However, future studies should examine the effect of movement and language or other subject areas integration on the development of motor, emotional and social skills, during both early childhood and elementary school years.

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