LEARNING THEORETICAL STUDIES THROUGH PHYSICAL ACTIVITY

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Abstract - The present study explored an intervention program which integrated physical activity (PA) through Eshkol-Wachman Movement Notation (EWMN) with theoretical learning at primary school. This was a field research designed to improve primary school pupils' attainments in and attitude towards a theoretical subject in geometry. The effectiveness of the intervention program was checked by comparing two experiment groups with two control groups. The experiment groups learnt the topics of angles and symmetries through the intervention program and the two control groups learnt the topics in the customary way which combines teachers' frontal explanation and exercising with the aid of a textbook. The factual conclusions indicated that the intervention program by PA through EWMN enables an integration of theoretical topics learnt at school with topics learnt according to EWMN. Moreover, they illustrated that the intervention program resulted in higher scores and more positive attitude towards the learnt theoretical subject.

Keywords - Eshkol-Wachman Movement Notation, Theoretical Studies

I. INTRODUCTION

The movement of the body parts is circular. The movement of the axis of any body part forms an angle in relation to the adjacent part. From any axis of a body part we can form a circle or part thereof. Consequently, the topic of angles as part of a circle can be demonstrated, understood and organically and naturally linked to movement lessons. Every body part has a circular movement from the joint to which it is connected. Every limb axis creates a circle or part thereof (see Illustration 1).

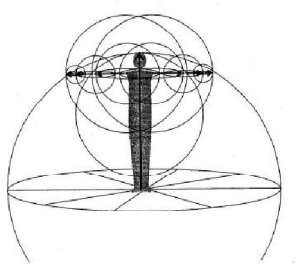


Illustration 1: Drawn example of the circular movement of every limb of the human body (Eshkol & Harries, 2001)

The natural given of extremities in the human body, two legs and two arms and the ability to move them, enables a view of rotational and reflection symmetry. The ability to advance in space while noticing the course of progress of the group, in each of the symmetry types, allows additional illustration of the topic and the understanding thereof. Based on the spatial division of EWMN, PA through EWMN of body parts in the two symmetry types can be examined. Developmental theories and studies of movement entail the possible and desirable implementation, integrating bodily movement as a learning tool close to pupils' being and daily life. Learning geometry topics – angles and reflection and rotational symmetries – which are compulsory in the Israeli Ministry of Education curriculum, can be studied by means of Eshkol-Wachman Movement Notation since it includes and implements these theories and studies. Integration of Eshkol-Wachman Movement Notation and geometry topics allows pupils to actively develop their bodily-kinesthetic intelligence and acquire another thinking language which can be documented and developed by using Eshkol-Wachman Movement Notation.

II. DETAILS EXPERIMENTAL

2.1. The relation between physical activity and arithmetic and geometry.

"The closer you look at the brain-body mutual activity, the more you realize that movement is essential for learning" (Hanford, 2002, p. 99). Physical-kinesthetic intelligence enables a movement which is part of any activity we perform. Consequently, it can be integrated with skills of spatial intelligence and logical mathematical intelligence in order to improve the pupils' theoretical learning (Shoval, 2006).According to Fiore (2014), the benefits of School Movement, is that the pupils feel involvement and a sense of belonging to the way the lesson is conducted in those schools which integrate PA with theoretical lesson plans. Especially when they are young or if the learning material is difficult, pupils can better understand the studied terms when PA is applied in order to perform the theoretical concepts. This is due to the fact that embodied cognition allows pupils to develop a physical sense of comprehension which is better understood and more convincing than understanding an abstract idea by an explanation. The relation between spatial intelligence and logical-mathematical intelligence is in line with Fadalon & Patkin (2000) who maintain that our world is basically geometric and that spatial perception is needed for

understanding it. Developing spatial perception and spatial skills is a practical and useful goal. Using spatial intelligence was found as highly crucial for the development and enhancement of mathematical thinking competences of young children (Fadalon & Patkin, 2000). Furthermore, the physical education curriculum in Israel (Ministry of Education, 2006) recommends integrating the PA with the theoretical subjects studied at school. This is based on the acknowledgement of physical learning as experiential, illustrative and suitable to every pupil. In light of the recommendation of the Professional Standards for Teaching Mathematics (National Council of Teaching of Mathematics, 1990), we have to choose a teaching method which will encourage pupils to understand rather than memorize the learnt material. A mindful movement (Shoval, 2009) underscores comprehension by means of the body movement which is in fact PA through EWMN. Implementation of mathematical activity and movement in space requires a visual expression of thinking and calculating. During the PA the pupils discuss the mathematical activity and the discourse between them offers an opportunity for immediate control of the learning. Pupils apply here a non-verbal thinking which is based on visual impression. This is thinking at an initial level which is connected to geometric thinking according to Van Hiele's theory of developing geometric thinking levels (Segev-Tal &Galili, 2010).

2.2. The Intervention Program

The intervention program integrated EWMN with two geometry topics taken from the primary school curriculum: angles and symmetries and was implemented for three years. During that period, all the participants read, wrote and moved according to EWMN as a basis for learning the movement language and its integration with theoretical subjects. Below are the three stages of the intervention program:
Stage 1: Learning the language of EWMN.
Stage 2: Integrating the language of EWMN with theoretical learning topics.
Stage 3: Integrating the language of EWMN with the topic of angles and the topic of symmetries.

In EWMN movement lessons, pupils learn concepts in geometry which are included in the curriculum textbooks dealing with angles and symmetries. The movement lessons (given to the experiment groups in the movement room) correspond to the lessons in the regular classroom (for the control groups). Every lesson combines creative movement associated with the lesson objective, the mindful movement dictated and defined by the teachers, and the reading and writing of movement from the EWMN manuscript page. Every lesson is based on the material studied in the previous lesson, bringing in something new from the subject studied. In every lesson there is an interaction between the pupils, manifested by joint writing and/or reading, by exchange of written pages, or by presentation of a movement exercise composed by the pupils and performed in front of the class. In the latter, the observing pupils also participate in the learning. They watch the presentation, identify the movement chosen, and are involved in the learning discourse. Thus, teachers can monitor the understanding of the pupils who composed the exercise as well as that of the observing pupils.

III. RESULT AND DISCUSSION

The research findings were analyzed by mixed methods research study.

Quantitative Findings

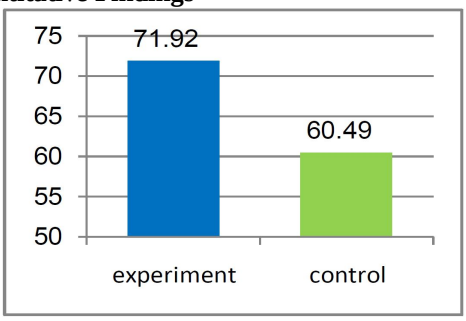


Figure 1: The difference in scores between the experiment and control groups

Qualitative Findings

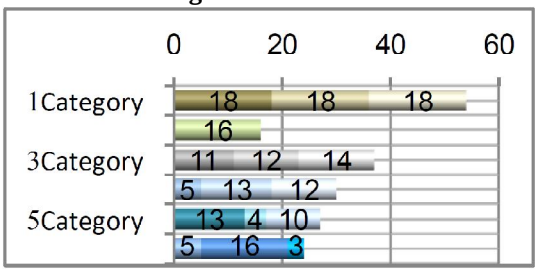


Figure2: The number of assertions for eachsub-category of each category

The research findings illustrate that learning by PA through EWMN facilitates comprehension of the learnt materials, e.g. angles and symmetries. Furthermore, it allows pupils to understand the topics through active learning and under the guidance of an adult. In addition, learning these two topics through EWMN evoked pleasure, a good feeling, and a successful understanding of the topics. The visual opportunity provided by movement offers the ability to understand through self-performance and/or observation of another pupil's movement. It also inculcates the ability to express comprehension by means of bodily movement in an open space, providing learning in an environment which is different from the one prevalent at present. The research findings also show that bodily movement and theoretical learning are characterized by thinking;

thus, it is important and possible to integrate them. The experience of movement by PA through EWMN combines cognitive, theoretical, logical, and deductive thinking as well as thinking which acknowledges the importance of rigor. Learning by means of PA through EWMN is built on explanation by stages and serves as a tool which enables meaningful occurrences in the learning. Furthermore, learning through EWMN allows pupils to demonstrate their comprehension of the learning materials and their ability to apply the knowledge they have acquired by designing creative and informed movement exercises. Hence, at any given moment, teachers can see the degree to which every pupil understands the learning material.

IV. CONCLUSION

The factual conclusions indicate that the intervention program by physical activity (PA) through Eshkol-Washman Movement Notation (EWMN) enables integration of theoretical subjects learnt at school with topics studied by EWMN. The research findings indicate that EWMN is a tool whose principles and subject matter allow its integration with a theoretical topic. Moreover, it leads to higher scores and positive attitude towards the studied theoretical subjects.

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