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רחובות, ישראל

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שילוב 'פדגוגיה מעוגנת גוף' בהוראה

**Movements As a Door for Learning Physics Concepts -
Integrating Embodied Pedagogy in Teaching**

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Abstract

How can we strengthen the affinity between scientific concepts learned in school and intuitive concepts that develop spontaneously? For example, what is the connection between naïve knowledge and scientific knowledge such as mechanics concepts taught in physics lessons? Research shows that students learning mechanics concepts at all levels experience difficulties in understanding these concepts and often conceptualize them differently from experts (McDermott, 1999). For many students, traditional teaching practices do not address this difficulty. This issue occupied many researchers of physics teaching who explored different strategies for coping with this difficulty such as finding means for active learning that will enable learners to link their naïve knowledge and scientific knowledge (Meltzer 2012). The underlying assumption of this research is that actual physical experience can be used as a unique resource for learning complex concepts in physics by associating them with daily body activities. Research indicates the significant role of embodied intuition in the interaction with the surroundings and in problem-solving (Clement, 1982; McCloskey, 1983; Smith & DiSessa, 1993).

Theories and research based on 'Embodiment', a cognitive science paradigm that regards the brain and body as one unit (Thelen, Schoner, Scheier & Smith, 2001), suggest the potential contribution of 'Embodiment' to learning. In this research we developed an instructional approach (Zohar, Bagno, Eylon, 2015; Zohar, 2015), 'Embodied Pedagogy', for learning physics that coheres with this paradigm. Our vision is to open new learning channels both for learners who specialize in physics as well as for those who are intimidated by physics or experience difficulties during studying.

In this research we explored, through two case studies, the potential of 'Embodied Pedagogy' for learning in high-school two complex physics concepts, 'balance' and 'angular velocity'. In the entire learning process, the contribution of the instructional approach to students' learning and understanding the concepts was evident. Moreover, in summative projects students expressed a deep conceptual understanding, creativity as well as philosophical and affective depth (Zohar, Bagno, Eylon, Abrahamson, 2018; Zohar, 2017). We try to characterize the processes that led to these results using a qualitative multimodal analysis of the learning process.