

BAR-ILAN UNIVERSITY

**Metacognitive Support-Based Teaching of Energy Conversions
and Energy Conservation Law –
its Influence on Students' Cognitive Aspects and Perceptions**

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Abstract

This study deals with the effect of metacognitive guidance on students' physics perception and on conceptual understanding and cognitive thinking skills among ninth graders in heterogeneous grades.

Metacognition is a super-skill in which the individual processes the information, supervises his own thought processes and criticizes the products of thought. Many researchers have concluded that metacognitive guidance has a positive effect on cognitive learning outcomes in science studies and knowledge construction design. This study deals with the effect of metacognitive guidance on the students' physics perception and on conceptual understanding and cognitive thinking skills regarding energy conversion and the energy conservation law among ninth graders in heterogeneous grades.

Physics is valued as a prestigious scientific profession and serves as a step towards higher education. The number of engineers and scientists, the distribution' rate of scientific research and the technological prowess of the country reflect the strength of the country, the quality of life in it and its economic capacity. As for students, physics is considered an important profession in its social and technological contribution, nevertheless, it is perceived as difficult to learn, less interesting than the other scientific subjects and relevant only to those who intend it in the future.

The world of physics relies on several major study topics, including energy. The concept of energy is crowned as one of the core concepts in the scientific disciplines and is taught as a spiral concept in K-12 grades, in many contexts. In middle school, the concept of energy is integrated into science studies in grades 7-9, including the subject of energy conversions and the energy conservation law. Students experience quite a few comprehension difficulties when analyzing physical phenomena, the meaning of the energy conservation law and analyzing their new situations (transfer). Researchers cite several factors that are a source.