

# **Various Strategies for the Teaching of the Topics of Chemical Energy And Chemical Equilibrium Development, Implementation and Evaluation**

Thesis for the degree Doctor of Philosophy

By Ita Cohen

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## **Abstract**

This thesis describes the process of development, implementation and evaluation of two units in chemistry on chemical energy and chemical equilibrium.

The development was based on previous research which identified student difficulties and misconceptions. In the new two units new learning strategies were used, in order to reduce these difficulties. These new strategies involved the student in the learning process.

The implementation stage consisted of a series of teacher-training courses which were held in order to familiarize the teachers with the new materials and give them guidance in their use.

The units were then tried out in class. The implementation consisted of three stages, two for the chemical energy unit and one for the chemical equilibrium.

The evaluation results revealed positive effects both in the cognitive and affective domains:

The new units helped students to overcome learning difficulties and improved their achievement in these two subjects, and, additionally – to deal successfully with unfamiliar problems.

One of the learning activities (small-group discussions) was found to be helpful for low-ability students.

Student experience with the new units resulted in their having positive attitudes towards the new learning strategies and the topic.

It was found that the affective outcomes of the trial also influenced student achievement.