

"Chemical Industry In Israel" A New Chemistry Unit For High Schools Development, Implementation And Evaluation

Thesis for the Degree DOCTOR of PHILOSOPHY By NEHEMIA NAE

Submitted to the Scientific Council of The Weizmann Institute of Science

Rehovot, Israel

September 1980

Abstract

This research describes the process of the development, implementation and evaluation of a new teaching unit: "The Chemical Industry in Israel". The unit was offered as an option for high school students who major in chemistry. It aims at demonstrating industrial applications of chemistry, presenting a general description of local chemical industries and discussing engineering, economic and social aspects involved in the chemical industry. The unit is innovative in its interdisciplinary approach and in the teaching method. It includes relevant examples of industrial applications of chemistry and elements of decision-making. A textbook was written in the form of three case studies describing, in detail, examples of local chemistry industry .

A series of in-service teacher courses were held to train teachers in teaching the unit. These provided information on the chemical industry and guidance in the organization of visits to industrial plants.

The unit was tried out in nine schools in the course of two academic years (1978/79 and 1979/80). A multiple measurement evaluation of the unit was conducted. The Experimental Group consisted of chemistry majors taking the unit and was compared to chemistry majors and to students in vocational schools who did not study the unit.

The evaluation results revealed that the new unit was accepted as an integral part of the curriculum "chemistry for High School". Students' achievements in the unit and in the part of the matriculation examination on chemical industry were relatively high and in correlation with students' grades in general chemistry studies.

The content of the unit and the textbook were found to be appropriate for chemistry majors.

The case study method was found to be effective for teaching such a unit. It led to lively discussions in the classroom and increased students awareness of aspects involved in the chemical industry.

A pre/post study has shown significant changes in students' preferences for topics to be studied in a unit on the chemical industry. The topics which were studied in the unit were perceived as more important after studying the unit. No significant changes

were found in students' attitude toward the chemical industry. This attitude remained positive after studying the unit.

Students and teachers indicated the need to include visits to industrial plants as an integral part of the unit.

Department of Science Teaching, Weizmann Institute of Science