

The Development of Tools for Assessing Students' Performance in Inquiry Type Experiments in the Context of High School Chemistry Laboratory

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Abstract

In the last decade we have observed the development of the inquiry approach as a means of instruction in science teaching. The Chemistry Group at the Science Teaching Department of The Weizmann Institute of Science, developed and implemented an experimental program "Chemistry by Inquiry", in the school year 1997-1998. This program is taught over a two-year period to grade 11 and 12 students.

Implementation of the program brought about the need for alternative means of assessment. This study deals with the development of tools used to assess students in "inquiry experiments."

The first section of this study describes the developmental stages of the assessment tools. In the second section, the workshops were documented and discussions were held with high school chemistry teachers, using "Chemistry by Inquiry" in their classrooms. The third section is concerned with the initial assessment of the developed tools .

The assessment tools were designed so as to meet the "inquiry approach" objectives:

- Imparting inquiry skills
- Fostering scientific thinking
- Applying Chemical and Scientific knowledge
- Improving communication and other social skills.

Assessment of the students' performance was based upon a combination of group written reports, and observations conducted by the teacher. In this way, two types of assessment tools were developed and validated.

The developmental phases of the tools included validation, testing of the reliability and assessment of its usability. The main findings were:

- A. The validity of the assessment tools was moderately high.
- B. The reliability of the assessment tools was moderate to good.
- C. The usability of the assessment tools was improved during the implementation phases.

- D. The mean grades in the experimental program "Chemistry by Inquiry" is similar to that of the "Bagrut" (matriculation) examination.
- E. The results of students achievement in the various inquiry skills were found to be some what different from their achievements on paper and pencil type test (as in the matriculation-Bagrut examination)
- F. The participation of the teachers in the workshops was vital both for their own professional development, as well as for the development of the assessment tools .

The findings in this study emphasize the importance of critically assessing students performing inquiry work in the chemistry laboratory. The improvement in scientific thinking skills and the ability to apply chemistry knowledge, as well as the fostering of communication and social skills, are all important components of chemistry literacy.