

Inquiry in the chemistry laboratory: The case of Palestinian population

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ABSTRACT

The inquiry-oriented chemistry laboratory has been meaningfully implemented in Arab high schools in Israel. During the last few years, more than 90% of Arab high schools taught according to the inquiry-oriented chemistry laboratory. This led us to inquire about the laboratory type in comparison with the traditional "close-ended" chemistry laboratory within the Arab sector in Israel regarding students' perceptions of the laboratory classroom learning environment, students' attitudes toward laboratory work, and students' question-asking ability. We then compared these variables for those students from the Arab sector who learned the inquiry-oriented chemistry laboratory with those from the Jewish sector in Israel in order to study how student-teacher interaction, as a result of culture, affected these variables.

Learning by inquiry has played an important role in recent years and is considered to be an important element in scientific literacy. Generally, the laboratory is integrated into chemistry education in order to improve students' learning ability and also to vary teaching methods. Combining inquiry experiments in the chemistry curriculum for high-school students gives students opportunities, besides the pleasure that they experience when dealing with materials or methods used to develop research skills such as asking questions, making predictions, designing experiments, collecting data, and drawing conclusions. The inquiry laboratory enables students to learn actively. In order to realize this goal, students have to examine their knowledge and rebuild it again during discussions with their peers in the working group.

On the one hand, in our current study it was found that the inquiry-oriented chemistry laboratory had succeeded in increasing the Arab students' actual perception of the laboratory learning environment and in bridging the gap between their actual and preferred perception of the laboratory learning environment, and in improving their attitudes toward laboratory

work. In addition, it also increased the Arab students' ability to ask more and better questions as a result of reading scientific articles and performing novel inquiry practical tests. On the other hand, differences were found between the Arab and Jewish students who learned according to the inquiry-oriented chemistry laboratory regarding their actual perceptions of the laboratory learning environment. More specifically, the Arab students had more positive attitudes towards laboratory work in "comparison with the Jewish students". The Jewish students' ability to ask more and better questions as a result of reading an adapted scientific article and after performing a novel practical test was higher than that of the Arab students regarding the number of questions and regarding the cognitive level of the questions. These differences were correlated to cultural and ethnic issues.

The results of the observations during the inquiry laboratory and through interviews with students and teachers (qualitative results) not only supported and explained the quantitative results of the study—they also provided answers and explanations for them. This indicates the validity and reliability of the quantitative results that were obtained during our research. More details are provided later in the thesis.