The affective experience of authentic science education environments: Design and Research

by Ella Yonai Advisor: Prof. Ron Blonder

This study explores an authentic learning environment centered on the scanning electron microscope (SEM). It consists of two parts:
Part A. The design, implementation, and reflection of an authentic SEM learning environment for two different populations: science teachers and students.
Part B. The research and development of models that reflect different aspects of students' affective experience in the SEM learning environment.

The thesis seminar will focus on part B of the study. It involved the evaluating and analyzing students' emotional responses to an authentic environment and how it influenced their perception of the activities' impact, as well as their beliefs about learning science. To evaluate the emotional aspects, a semantic differential emotions questionnaire (SDEQ) was developed, based on an exploratory qualitative analysis of students' open-ended written feedback. The resulting SDEQ items were validated and applied to multiple groups of students who participated in the SEM activity. The results were then combined with the perceived authenticity questionnaires, as well as questionnaires that evaluated students' self-efficacy and science aspirations in order to create several statistical models using the structural equation modeling method. Importantly, these models indicated that students' emotions played a crucial role in mediating between their perception of authenticity and their self-efficacy and perception of the activities' impact. However, although students' perceived authenticity was found to be a significant predictor of their change in aspirations before and after the activity, their emotions did not mediate this change.

The contributions of this study are twofold: First, the study suggests that the SDEQ approach provided valuable insights into emotions in the SEM learning environment and uncovered unique emotions not previously identified in other learning settings. The study also expanded the range of learning situations that can be subjected to emotion assessment, specifically out-of-school science learning. Second, the study found that the design of an authentic learning environment is linked to a high arousal of emotional scales, mainly positive emotions. It also suggests that an explicit "emotions-on" aspect is an essential contribution of out-of-school learning environments, and that learners' well-being should be acknowledged as a goal during science learning.