Developing Critical Thinking Skills in High School Students within the Context of Environmental Issues: A Comparative Study between Arabic and Jewish Societies

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Abstract

The spread of misinformation on digital platforms has made it increasingly urgent to equip students with critical thinking skills that help them evaluate claims, analyze evidence, and make informed decisions. This study investigates the impact of the "Chemistry, Climate, and the Numbers In Between" program on the critical thinking skills of high school chemistry students from Arab and Jewish societies in Israel, with an emphasis on how cultural contexts shape learning outcomes. The program leverages socio-scientific issues, such as climate change and renewable energy, to integrate critical analysis into chemistry education. To guide the research, we posed the following questions: How does the "Chemistry, Climate, and the Numbers In Between" program influence students' critical thinking skills? Are there differences in the development of these skills between Arab and Jewish students? The study employed a mixed-methods approach, involving 238 participants (133 Arab and 105 Jewish) from grades 9–12. Delivered via the "PeTeL" online learning environment, the intervention included three instructional units over eight hours. Students completed pre- and post-test questionnaires designed to assess their critical thinking skills, using scientific articles and Facebook posts as tools for evaluation. Data analysis involved paired t-tests to measure individual progress. The results demonstrated significant improvements in critical thinking skills for both Arab and Jewish students, with Arab students showing particularly substantial gains. These outcomes closed initial performance gaps between the two groups, illustrating the program's potential to address educational disparities tied to cultural differences. The data also revealed that students made greater progress in analyzing scientific texts than Facebook posts. However, this may be attributed to the fact that their initial critical thinking levels were already higher when engaging with social media content, leaving less room for further improvement compared to scientific texts. This finding underscores the challenge of applying critical thinking skills to familiar, everyday content and highlights the value of a structured approach that embeds socio-scientific issues into the curriculum while explicitly teaching critical thinking skills. The program proved to be an effective tool for nurturing these skills, empowering students to navigate complex contemporary challenges more thoughtfully and systematically.