

Intervention program improved the understanding of elements, compounds, and mixtures at the microscopic and macroscopic scales among eighth grade students

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Research Purpose

- The present study was designed with aim to determine the effect of an intervention program (simulations and modeling) on improving the understanding of elements, compounds and mixtures subjects among 8th grade students.

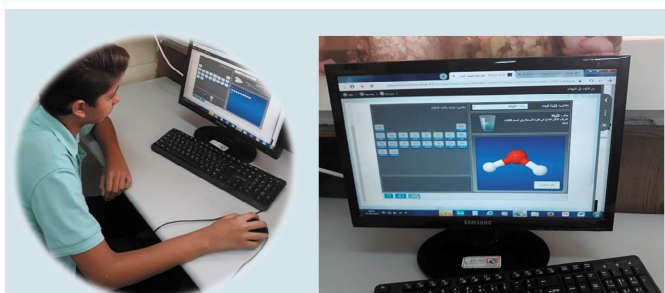
Research Questions

- What are the prevailing common misconceptions regarding the elements, compounds and mixtures both at the microscopic and macroscopic levels among eighth graders?
- Will the application of an intervention program be able to bring about a conceptual change among 8th graders studying elements, compounds and mixtures?

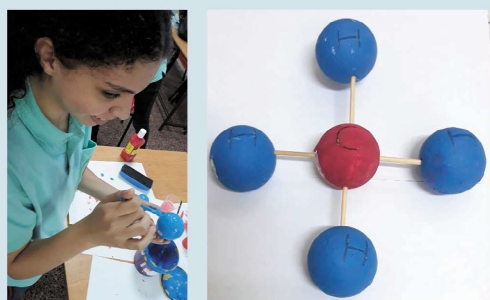
Research Tools

- Semi-structured interviews (pre-post).
- Achievement test.

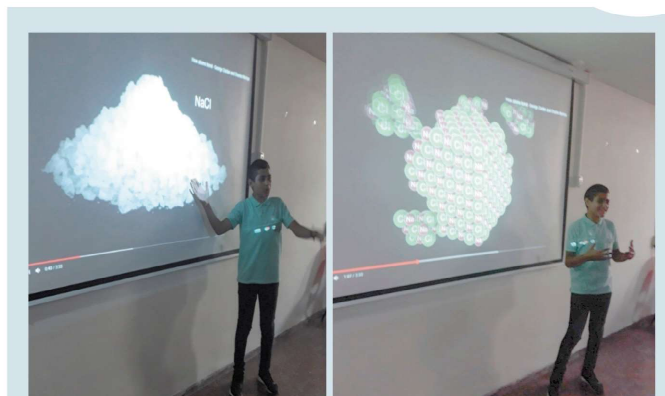
Examples of the activities



Electronic activity to construct molecular molecules such as H₂O



Modular construction



Simulation to explain the structure of ionic materials

Findings

Our results indicated that prior to the intervention program, 8th graders had the following misconceptions:

- An element is the only thing that exist in a pure form.
- The physical properties of all mixture ingredients are similar.
- The properties of given material are similar to those of the atoms that construct it (e.g., the sulfur particle is yellow, hence the color of the compound in which it is present will be the same)
- All materials are made of molecules

A change in these misconceptions was observed post-intervention.

Most students adapted correct conceptions instead.

Summary

Students find it difficult to cope with the microscopic and macroscopic levels. Hence, they confuse the properties of the material at the macro level with those of the particles at the micro level.

This misconception stems from the great difference between the microscopic and macroscopic levels, eventually leading to even additional misconceptions.

The teacher must believe and implement the new goals of teaching and learning based on the constructivist approach that emphasizes the development of "Thinking learner" and not only to transfer the knowledge, therefore the learner becomes a partner in the process of learning and building a knowledge student-centered teaching.