

The Effectiveness of Analogies in Learning of Concepts of Structure of atoms by Eighth Graders

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Abstract

Although we usually use analogies in our daily life, neither do we know "how it comes" and "how it produces mapping" nor the application of an analogy to the learning of scientific concept. Therefore, this study aimed at investigating whether the analogies were helpful to the learning of scientific concepts. And if it was, how did analogical mapping influence the learning achievement?

A teaching materials for learning structure of atom --one include analogies, the other did not include analogies--was designed to investigate whether the analogies was helpful to the learning. Twenty subjects of averaged ability at the eighth graders were divided into two groups--analogy and control groups. Each group was composed of ten subjects. The experimental procedures included a paper-and-pencil test, reading activities and post-test interviews.

The results of study were:1.This study found that the analogies were helpful to the learning of 'structure of atoms'. Also, they were able to understand the electronic cloud models of atoms via reading materials with history of atoms. 2. As to analogical mapping, there was not absolute difference between the two groups but in degree. However, the group of high achievement could generate more relational mapping, especially that of higher-order mapping. In contrast, the group of low achievement tended to generate attributive mapping and thus lack high-order mapping. 3.Students held produced alternative conceptions while using analogies and their analogical mapping and interpretations did not always correspond to teaching materials because of the influence of prior knowledge and the fact that students did not understand analogies at all. 4. Learning structure of atoms with pictorial analogies helped students construct mental images that supported their learning of abstract concepts.

To sum up, teachers and editors of teaching materials can use analogies to promote the learning of science. However, the mapping of teaching materials should be explained in details to ensure that students' and teachers' mappings and interpretations of analogy are parallel. Furthermore, the design of mapping materials should base on subjects' life experiences to ensure the effectiveness of analogy.

Keywords: Analogy, mapping, structure of atom