THE DIFFICULTIES ENCOUNTERED IN TEACHING ABSTRACT CONCEPTS OF CHEMISTRY

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Chemistry is one of the most difficult sciences in terms of learning, which is taught in the school course. The fact is that the subject of this science is often invisible, and intangible.

Concepts are the fundamental building blocks of science and are at the center of the learning process. Concepts are mental images used to group and understand similar objects, events, ideas, and processes. Among the general characteristics of concepts are learnability, usability, clarity, generality, and strength [1].

The basic concepts of chemistry are chemical elements, atoms and molecules. These particles belong to the microscopic level of knowledge, and it is impossible to see these particles, even considering scientific and technological progress. Even in a well-organized lesson, where students have the opportunity to carry out various manipulations with substances, they do not see the elements themselves, while observing just chemical processes. Furthermore, there is a need to add conclusions and convincing evidence that chemical elements exist, and that they determine both the composition and behavior of a substance.

Such abstract concepts are always difficult to grasp for learners due to the lack of adaptation of the human brain to work with abstraction. Students experience difficulties in understanding the text of the textbook while studying the structure of the atom. The use of visual models by the teacher, and the involvement of students in creative activities, for example, the production of various methodological models of an atom from modeling clay, is one of them, the abstract concept becomes more accessible to understand, because now the student can cognitively perceive the material being studied. However, despite the production of atomic models, difficulties arise in studying the distribution of electrons at sub levels. The modeling of this level is complex and can be replaced by the method of analogies.

This is directly connected to the individual abilities of the student, the volume of his basic knowledge, cognitive processes used in teaching, epistemological barriers, perception of scientific language, and abstract concepts of chemistry [2]. Furthermore, difficulties in teaching abstract concepts include the need to use abstract models, give explanations in reasoning, etc. These difficulties lead to misconceptions, and an incomplete understanding of the further course of school curriculum.

From all mentioned above, it is possible to conclude that modeling and the method of analogies are the most effective, and only by overcoming these difficulties one can achieve the correct formation of basic scientific knowledge, which also facilitates further education in chemistry and contributes to the formation of a scientific worldview.

1. B.Akman, Concept Instruction in Science Education, In book: Current studies in social sciences, 2023, ISRES Publishing, Konya, Turkiye, p. 77–90.

2. A.H. Simone, “Impact d'une formation collaborative donnée à des enseignants de chimie du secondaire sur l'enseignement et l'apprentissage du concept de mole” doctoral thesis, University of Montreal, 2019.