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## Using Conceptual Change Texts in Chemistry Education

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### Abstract

*Concepts and concept teaching are very important in constructivist approach. Literature was reviewed for implementations of conceptual change to eliminate misconceptions in science teaching in this study and the results of some research which was implemented were mentioned. According to literature review, the importance of conceptual change implementations was stressed.*

*Key Words: Science Teaching, Chemistry Teaching, Conceptual Change Texts*

### 1. Introduction

The main cases which teaching science require are students' examination of the events occurring in their environment, doing observation, and explaining the cases. In this regard, countries follow the developments in teaching science closely and they find opportunities to implement innovations. While implementing the new teaching approaches, the results of the countries from international assessments (PISA, TIMSS) carried out at international levels are also taken into account.

Curricula based on constructivism have been implemented at primary school, secondary school and high school levels in Turkey since 2000. Students' prior knowledge has an important place in constructivism. Students' prior knowledge and misconceptions, if there are, must be identified and teaching must be shaped regarding these [1].

### 2. Concepts and misconceptions

Concepts are the building blocks for knowledge. According to Koray and Bal, concepts enable individuals to classify and organize what they have learnt [Cited:2]. Because concept teaching is important, it is viewed that implementations of many teaching methods and techniques are carried out.

Gönen and Akgün state that while students are learning concepts, some kind of mislearning may come into question. Misconceptions (or alternative conceptions) refer to the inconsistency which concepts create with their scientific definitions in students' minds [Cited:3]. In this respect, science curriculum include many abstract concepts, so teachers and pre-service teachers must receive a good training, which must be given importance as they are going to teach science subjects and enable meaningful learning [4].

### 3. Implementations of conceptual change

Because meaningful learning takes an important place in teaching science, it is important to determine cognitive restructuring and how it constructs the concepts. In respect to this, it is essential that students' misconceptions should be identified and conceptual change should be provided. Erroneous understandings in a subject matter may impede learning of a new subject and concepts related to that subject matter [2].

Özmen and Demircioğlu define conceptual change texts as the texts which explain students' alternative conceptions and the reasons for misconceptions and which explain that these understandings are inadequate via examples. The following features generally belong to the conceptual change texts:

- Misconceptions related to the subject to be taught are specified
- Inadequacies and wrong situations are explained.
- Awareness is created about students' lack of knowledge.
- Conceptual change is tried to be actualized [Cited:3].

Literature was reviewed and some implementations of conceptual change in teaching science were given

below:

Özay in his study carried out implementations of conceptual change to remove the 9<sup>th</sup> grade students' misconceptions about mitosis and meiosis. In his experimental study, Özay stated that students learned concepts related to mitosis and meiosis better and their misconceptions were removed [3].

Uluçınar Sağır, Tekin and Karamustafaoğlu in their study examined the pre-service primary school teachers' state of understanding some chemistry concepts. The findings of the research revealed that pre-service teachers had some misconceptions about physical and chemical change, types of reaction, and solubility [4]. Karslı and Ayas examined the misconceptions of pre-service science teachers about the subjects in chemistry. Regarding boiling point, they had a misconception "the first temperature of the liquid affects the boiling point". About neutralization, a misconception "All the reactions which formed salt in the product are a reaction of neutralization" was found. Regarding solubility, they had some misconceptions such as "Cooling the solution will not certainly increase solubility"[5].

Cerit Berber and Sarı in their study explored the effect of teaching activities based on conceptual change on students' affective characteristics. It was found in the research that regarding interest in physics course, more positive results were obtained [6].

Şendur, Toprak and Pekmez in their study benefited from analogies which were formed with regard to meaningful learning to remove misconceptions of 9<sup>th</sup> grade students about vaporization and boiling subjects. As a result of the research, it was stated that students' misconceptions were removed. Some of the misconceptions discovered in the study are: "There are expanded liquid molecules, trapped air in the bubbles which are formed during the boiling water". "The temperature of water increases if we heat the boiling water extra 10 minutes." "When the hallways are washed with water or mopped, water which evaporates rises, it merges with the air as moisture and it hits us. Therefore, saturation is detected" [7].

Çobanoğlu and Kalafat in their study tried to remove the misconceptions of 6<sup>th</sup> grade students with conceptual change texts. The study was carried out with 23 students and it was found that the students' performances increased [8].

Pabuççu and Geban investigated the effects of conceptual change texts on the 9<sup>th</sup> grade students' understanding of concepts related to chemical bonds. The aim of the study was to make students aware of misconceptions via conceptual change texts. Analogies, which were included in the conceptual change texts, were utilized. It was revealed in the study that the group that was exposed to implementations of conceptual change had a higher progress [9].

#### 4. Results

Concepts are required to be learnt better by the students in constructivist approach. Because the new subjects are built on prior knowledge, restructuring must be sound. In this respect, students' misconceptions must be determined in learning environments and approaches to remove these determined misconceptions must certainly be used. When the results of the studies carried out in literature are examined in the section of implementations of conceptual change, it is found that implementations of conceptual change texts reveal positive outcomes to remove students' alternative misconceptions and to promote positive attitudes.

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