Chemistry is All Around Network
Workshop on "Successful Experiences"
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Minutes

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The aim of science education is teaching students the right ways of getting scientific knowledge and improving students' scientific understandings. With this way, students are expected to become science literate.

It is seen that different approaches are being implemented to students in the process of achieving the scientific knowledge. Positivist thinking approach is one of these kinds. With this approach the target for students is reaching the objective knowledge with using inductive and deductive methods. Meaningful learning and teaching with discovery comes to the forefront in positivist approach. In meaningful learning, the connections between the concepts come into prominence and deductive approach is being used. At the same time, in discovery learning students are being expected to achieve objective knowledge with using inductive approach.

Today students are intended for approaching the phenomenon as a scientist for getting subjective knowledge. In this regard, students can fall into some misconceptions while creating their own scientific knowledge. In this respect, determining and rectifying these misconceptions become crucial.

Chemistry education which takes part in science education has important relationship with other as disciplines and therefore, it has significance importance in science. Chemistry is seen difficult by educators, researchers and chemistry teachers. The reason this difficulty comes from the abstract nature of concepts and also the symbols and equations that used in chemistry. With parallel to this, so many research results indicates that there has been difficulties in teaching so many concepts in chemistry and at the end of the teaching process misconceptions and misunderstandings of concepts has been identified in students(Taber, 1997; Boo, 1998; Tan and Treagust, 1999; Nicoll 2001; Piquette and Heikkinen, 2005;cited; Doymuş and Şimşek, 2007).

It is seen that some applications are done to provide students with establishing knowledge in best way. Concept caricatures are commonly used in chemistry teaching. It can be said that usage of concept caricatures are done in two different ways. In the first approach, teachers construct concept caricatures and

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give students work sheets. In the second approach, students are given a specific topic .Then; students prepare concept caricatures about the topic. It is known that the second way is more used. This approach is said as more effective in reducing misconceptions. A study which is related to construction students' knowledge correctly, (Öztuna Kaplan and Boyacıoğlu, 2013) links between atoms are resembled to blood links. When such types of studies are examined, it is seen that students can embody concept correctly. As a result of the study, it is seen that students can learn topics effectively. Thus, it can be said that concept caricatures are successful methods in teaching. Because of this reason, they can be used in teaching more frequently.

One of the ways in chemistry teaching to provide students with effective learning is analogies. (Bilgin and Geban, 2001). Important points in applying this method can be ordered as:

Analogies should be determined according to topic
Analogies should be related to students' prior knowledge
Analogies should be constructed from known to unknown
The link between analog and goal of the course should be constructed by students
Another important thing in analogy teaching is that teachers should give importance on "breaking points" to prevent misconceptions.

The presence of experimental applications is an essential element of chemistry education. It is essential role for both teachers and students in learning and teaching in order to construct meaningful learning. For effective chemistry laboratory application, scientific process skills (SPS) should be integrated to learning process. Laboratories should not only serve the aim of reinforcing theoretical knowledge, but they should also allow students to discover knowledge on their own. Therefore, there is a need that laboratory application should engage students in using SPS such as problem analysis, research plans, research management, data recording, and interpretation of findings to construct and organize their own learning. The study (Feyzioğlu, 2009) shows that there is a positively significant relationship between SPS taught in laboratory applications and their achievement in the course. Therefore, laboratory applications with SBS should be employed for more effective chemistry education and meaningful learning.

To employed daily life experiment in chemistry lesson is also essential factor for meaningful learning. Especially science topics should be related to daily life in order to activate student's interest, curiosity about the content and meaningful learning. Also, teachers should design learning environment that students enable to use their knowledge in order to understand daily life events. For example, teachers can ask students whether they observe any color change when adding lemon juice to the cabbage salad in acid-base lessons and then they discuss the reasons of color change. Therefore, students can learn and remember new information best when it is linked to daily life.

Questioning takes important place for students' learning in chemistry teaching. In this respect, students should be active participants in learning environments. Some of active teaching methods are project based teaching style and principle based teaching. Students try to solve problem cases with group work in these kinds of methods. Besides, students can develop new designs and proper activities related to their topics with projects. Thus, students will gain lot of skills and provide meaningful learning.

Chemistry teaching has a lot of intangible concepts. Particularly, it is very important that embody the intangible concepts in molecular structure topics. In this respect, ICT applications should be use. But, while ICT applications use, it is paid attention that use computer supported applications and get supported with tangible applications. Thus, we can say that students will learn the topics effectively.

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If chemistry teachers are sufficient in chemistry field, this sufficiency will contribute to their teaching. In this regard, in service training should be arranged for teachers, teachers should be informed about new methods and teachers should be encouraged to doing master degree and PhD. It is seen that the teachers who improves themselves in their fields make more effective teaching in their classes.

Experiments should be designed according to the student's prior knowledge and cognitive skills. Thus, meaningful learning is provided instead of memorization. In addition, teachers should provide opportunities that can take an active role to students in their own learning (Ricco and Carnasciali, 2014). Chemistry education is a basis for the development of modern society. For this reason, the investments that made in this area are important. In this point, some investments that are for educating students who have responsibility and make active participation must be made. Teachers have great role in educating these students. Teachers must explain some events that environment for students occurring in daily life, they must interpret these events and they must response to students' interests when determining experiments that to be applied (Gonçalves et al, 2014). When studies are examined, it can be said that active learning areas should be prepared for students in chemistry learning. Students must be in the academic environment for doing and experiencing science and they should configure their own knowledge. Students must gain some skills that can work in experimental environment. Substantial experiences are significant for students' learning. As well as, computer aided practices can be used for concretizing abstract concepts. Finally, with all these methods and practices students would learn chemistry more effectively.

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