Using computer animation simulation in chemistry in order to solve students misinterpretations and misconceptions about oxidation – reduction reaction.

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1. Introduction – Chemical education researches have recognized that students often have difficulty learning chemistry concepts, and have proposed several suggestions as to the reasons for this difficulty, including frequent overloading of student working memory [1-4]. The researches on misconceptions and misinterpretations in oxidation-reductions reactions has focused on students‘ difficulties in properly identifying oxidation-reduction reactions [5]. In this work , we report a study that employed computer simulations to demonstrate an experiment that was relevant to the solution of chemistry problems. The goal of this study was to identify student errors as they attempted to interpret and explain the chemical processes. This research involves the use of qualitative y quantitative test and questionnaires to identify students ‘misconceptions. The effectiveness of using computer animations of chemical processes at the particulate level is based on Mayer´s cognitive theory of multimedia learning [6]. This theory assumes that leaners possess separate cognitive channels for processing visual and auditory information.

2. Experimental – This study was created as a descriptive study in which the survey technique was used. The study was carried out during the course 2013-2014. The sample consisted of 90 volunteer students (85 males and 5 females) from the first course of Mechanical Engineer degree, during the first semester, introductory chemistry course taught by two different chemistry instructors. Each student made 5 or 4 tests. The three groups which had participated, had the same experience in working with chemicals in lab, and two of the all three had attended the same computer simulations. The scale of the test was a five point Likert type scale with a range of five options. The positive items range from 1= Certainly Agree to 5 = Certainly Disagree. The relevant knowledge before and after the use of visual tools was identified using a pre- and post- test. What they thought that they knew about the topic was measured using a Questionnaire, before and after the use of the visual tools. And finally, only two groups, which had used the visual tools, answered the utility test about the visual tools.

Computer animation. This program was about the silver-copper reaction, it was animated as two dimensional and when two objects approach each other, they were animated as colliding and bouncing off each other. The total viewing time for this animation is less than 1 minute.

3. Results and Discussion –The highest post test scores about the knowledge were obtained by students with high prior knowledge. And greatest gains were achieved by students with low prior knowledge who had high disembedding ability and used deep learning strategies. Animation encourages students with low prior knowledge to develop new ideas to create their mental models.

Turning to some qualitative aspects of the use of the simulations, discussions with the students after the intervention showed that most students initially assumed that the simulation did not help them in the solution of the problems but were useful in helping with the proper application of the equations. Further discussion revealed some interesting aspects of the students´ actions and attitudes, with several of them admitting that through the simulation cleared something in their minds.

4. Conclusions

The use of computer simulation can be helpful in improving problem solving. We recognize that other types of intervention might have been equally effective; but the issue here was whether a particular approach would be effective.

5. References

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