THE EFFECT OF CONCEPT MAPPING ON ACADEMIC ACHIEVEMENT LEVELS AND HIGH LEVELS OF SELF-REGULATED LEARNING TOPICS ATOMIC STRUCTURE

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ABSTRACT

This study aimed to determine the effect of concept mapping on academic achievement levels and high levels of self-regulated learning in secondary school chemistry topics atomic structure was implemented. The study was conducted using random cluster sampling. The sample consisted of all students in the second year of high school in Tehran 60 people a randomly assigned to two experimental and control groups. In the control group chemistry lecture (traditional) and experimental group, the students were taught lessons in the form of concept map. The effect on the academic achievement of learners at the end of this lesson through achievement tests measured parameters with acceptable reliability and validity. Also, self-regulation strategies of students learning motivation were assessed using a questionnaire. SPSS 21 software was used for data analysis. The results showed Significant effects on Academic Achievement and increase self-regulation concept mapping surface atomic structure chemistry is the learning topic. The results of this study, the use of concept maps in chemistry teaching can have a positive impact on the academic achievement and self-regulation has higher levels of learning.

KEYWORDS: Concept mapping, academic achievement, self-regulation, high levels of learning, atomic structure, chemistry
INTRODUCTION

Humanity advances in chemical education reforms have created. Nowadays, educational theorists have concluded that the application of modern methods of teaching, learning process and facilitate learning makes learning more. Educational psychologists have long sought to understand how these factors affect learning and academic performance. Until the eighties the grade students in order to catch my eye was that the Malachi. Thus their study focused on the factors enhancing score. Subsequent research showed that since 1980, especially since it cannot score a lot of information to students about learning. Why psychologists seeking academic practices and factors affecting learning, motivation factors influencers looked. (1) Theory in the motivation of researchers has studied the theory of self-regulated learning. Pintrich, self-regulated learning as an active process and processing structure defines the learning objectives, learning activities, knowledge, motivation and behavior to regulate and control. Learning self-regulation in other words, the behavior of participation Fqal from the standpoint of the learners, motivational and cognitive learning refers to the learning process for most. (2) There are some strategies that emphasize active learning and thus achievement and self-regulation (Self-regulation) have a positive impact including strategies learning meaningful and organized pattern Ausubel (3). Organized to advance the concept, story or topic that should be used in teaching a lesson and thereby, parts and various materials that make up the field of knowledge, particular order or organization should be inclusive in mind. Creating such a system in mind a general note that the organizers call starts, in other words, the organization is a topic or concept is taught in the introduction to a topic that will be provided to students with previous topics related to the lesson and yet, the basis for the next coherence with previous concepts and students can learn all the topics organized into a building to place in your mind. The overall pattern of the part of the organizers usually content to justify (4) Ausubel builds cognitive theory (Cognitive Structure) is an aggregation of information and concepts in mind, there is a series of lessons, making his understanding of the science of form. For example, the concepts of chemistry have already been created in the minds of students, the overall construction of the cognitive science of chemistry to form. New concepts and knowledge of the concepts and our previous knowledge, or in other words, is related with the construction of our knowledge, are learning to be meaningful learning, (4) After the pattern organizer Novak, at the beginning of the seventies along Ausubel theory of concept mapping (Concept map) for meaningful learning proposed (5). A new training strategies that play an important role in learning and subsequent academic achievement is profoundly significant, concept mapping is a technique that results in the formation of a knowledge base of scientific content is organized. Scientific concepts, non-linear and network such as the network of concepts should be organized and to be relevant information to be learned, not merely a list of independent facts. 6 Concept mapping as a strategy to facilitate the teaching, learning and assessment are used (7). The use of concept mapping helps students to learn the knowledge of an area to take a picture and additional information and reduce spread
Using concept maps in various educational fields such as biology, chemistry and geology has had some positive results as an instructional strategy that can also be used as a learning strategy (6). Mih their research suggests that concept maps in school can have a positive effect on learning performance. (5). the predicted Novak, today in most areas of education, from curriculum to assessment, concept maps are used in different ways (6-9). One of the basic courses in high school chemistry and mathematical physics is an experimental science in Iran, at the base of the second, third and the universities are taught. This lesson is the importance of high school; most students in this course have suffered loss Ausubel that one can use effective teaching methods book down that prevents Students in this course will be of interest. Hence it is need to try new teaching nursing students to be used as a conceptual map (10). The purpose of this study was to determine the effect of concept mapping on achievement, self-regulation in students studying chemistry. Thus, the hypothesis of this study includes the following:

1 - Conceptual plans have a positive impact on the academic achievement of students in a chemistry course topics is the structure of the atom.
2 - Concept mapping high levels of self-regulation have a positive impact on student learning in chemistry, atomic structure that topic.

MATERIALS AND METHODS

Research projects currently quasi-experimental pre-test and post-test were compared with a group that is appropriate for this study. (11) The population in question, a second year high school students in all disciplines of science, in Tehran, was 2013-2014. Due to the availability
cluster random sampling method was used. Thus the high schools of Tehran, a randomly selected 60 subjects were assigned to experimental and control pain (Each group 30). Independent variable and the dependent variable in this study, concept maps also are learning at high levels of academic achievement and self-regulation. Initially, the subjects were pre-tested. The atomic structure of the second year of high school chemistry book style concept map during the six-hour session, the experimental group was given a during these six sessions conceptual content of this chapter was installed in the classroom. While the atomic structure during the six-hour session, a lecture was given to the control group at the end of the test was taken from both groups. SPSS 21 software was used for data analysis. In this study, the four tools such as concept maps, educational materials such as posters, concept mapping, atomic structure, achievement test and Motivational Strategies for Learning Questionnaire was used. Concept maps for teaching the atomic structure of two high school chemistry have been used in this study was a self-made and to determine the validity, concept maps made by the researcher who had five teachers and three university professors of chemistry were developed. After reviewing several necessary modifications were done and then implemented. At this stage, the group also took classes in drawing concept maps, concept maps have been installed in front of the class and each of the concept maps of the students were tested. To test the reliability of the factor analysis on the Dygarot and Pintrich’s survey and 5 factors were calculated from the results is as follows: Self-Efficacy Scale (0.83), intrinsic value (0.87), test anxiety (0.75), the use of cognitive strategies (0.83), and self-regulation (0.74). Also Mousavi race, total reliability test using Cronbach’s alpha (0.82) has reported. In this research to gain Motivational Strategies for Learning Questionnaire reliability were Cornbrash’s alpha values to 0.76 respectively.

RESULTS

In studies related to this study before the test and control groups were tested every 60 people and all were present at the end of the study. There is more information on the survey data in Table 1, for each of the visible variables.
Table 1: Average results of pre-test, post-test and the two tests

<table>
<thead>
<tr>
<th>Difference of two test</th>
<th>Posttest</th>
<th>Pretest</th>
<th>Number</th>
<th>Group</th>
<th>Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard deviation</td>
<td>Average</td>
<td>Standard deviation</td>
<td>Average</td>
<td></td>
</tr>
<tr>
<td>0.033</td>
<td>1.02</td>
<td>11.18</td>
<td>0.73</td>
<td>10.81</td>
<td>30</td>
</tr>
<tr>
<td>4.8</td>
<td>1.55</td>
<td>15.98</td>
<td>1.21</td>
<td>10.64</td>
<td>30</td>
</tr>
<tr>
<td>0.001</td>
<td>0.001</td>
<td>0.89</td>
<td></td>
<td></td>
<td>p-value</td>
</tr>
<tr>
<td>1.19</td>
<td>0.95</td>
<td>11.95</td>
<td>1.07</td>
<td>10.76</td>
<td>30</td>
</tr>
<tr>
<td>High levels of self-regulated learning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.47</td>
<td>2.09</td>
<td>16.33</td>
<td>1.22</td>
<td>10.36</td>
<td>30</td>
</tr>
<tr>
<td>0.001</td>
<td>0.001</td>
<td>0.73</td>
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<td>p-value</td>
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</tbody>
</table>

In Table 1, the mean pre-test and post-test students participating in the study in terms of each variable is shown. As can be observed between the control group and the test scores of students in the academic achievement variable is not significant difference (0.50). The results indicate an increase in test scores between the two groups in the two groups (0.001). Comparison of scores between pre-test and post-test shows no significant difference between the two groups (0.001). Also, high levels of self-regulated learning variables in the two groups at pre-test; the difference was not statistically significant (0.73). However, the results indicate an increase in test scores in the two groups (0.001). Comparison of scores between pre-test and post-test shows a significant difference between the two groups (0.001).

Table 1, the mean pre-test, post-test shows the difference between the two tests. As can be seen, no significant differences between post-test results for both variables, high levels of academic achievement and self-regulation of learning in groups can be seen (0.05 > p). With regard to the significance level calculated in Table 1, the variable academic achievement (0.001), Assumption 1 (concept maps have a positive impact on the academic achievement of students in a chemistry course topics atomic structure is), may be approved and therefore null be rejected. Therefore, based on the results of this study, the use of concept mapping has a positive impact on student achievement in chemistry. Also according to the significance level calculated for variable high levels of learning self-regulation (0.001), Assumption 2 (conceptual map of self-regulation have a positive impact on the level of student learning in chemistry is a topic of atomic structure), the null hypothesis is accepted or rejected. Consequently, the results of this study, the use of concept
maps positive impact on student learning in higher levels of self-regulation are the atomic structure of chemistry topics.

DISCUSSION

Concept maps undoubtedly very powerful tool for teaching, learning and assessment, scientific concepts, especially diverse topics such as chemistry and adverse outcomes could be increasing depth learning, access to higher levels of abstract thinking, cognitive and pointed. Concept maps can also via pen and paper and draw through advanced software for the computer. Encourage students to draw a concept map to get involved in their mind with concepts and logical connection between them and that teaching and learning methods to achieve cognitive, has great value Concept maps are also useful for teachers. They make explicit the connections between different aspects of the issue, so the opportunity comes up a lot in teaching examples and explanations will be provided. Based curriculum concept map has some advantages compared to conventional curricula. Its use leads to an increased understanding of the concepts and academic achievement test scores of students. The use of concept maps in chemistry education that have great ideas and abstract concepts can deepen understanding and help. Concept maps have always been designed as a successful strategy in improving education in order to evaluate and understand learning and learners' ability to achieve innovative thinking is used. Findings related to the first hypothesis (concept maps have a positive impact on the academic achievement of students in a chemistry course topics are atomic structure) showed that in general the use of concept maps as a teaching strategy - learning has a positive impact on student academic achievement. Using concept maps can be implemented as a matter of information unknown relationships between the components are easily demonstrated. Other studies show that the use of concept maps positive impact on critical thinking and problem solving skills to learners. (12) The majority of the research conducted within and outside the country, the story of the influence of concept mapping on student achievement is different. (13) Among the research done in this field abroad took the Charlot research is showing that, concept mapping affect learning and achievement in lessons are in English. Further research is aligned with the findings of research conducted in 1993, which is Harsum et al and found that the total impact of concept mapping on achievement and attitudes of students. Results of Stensvold's research and Wilson, and Hall and O'Donnell, showed that concept mapping has a positive effect on learning performance. (14) Also in Msr Abady study showed that concept mapping on student achievement in biology course has a positive effect (6) Nezamabadi paper using concept maps as new developments in medical education have been mentioned (15) Khamesan the study showed that the use of concept maps in learning English effectively. Msrabadi and colleagues on the effects of concept mapping as a learning strategy on academic achievement, student teachers in teaching elementary knowledge of exceptional children to review. The results showed a significant effect of concept mapping on learning of
student teachers (16). Rahimi et al used this approach in learning theory and nursing students Fathi Azar et al examined the application of this technique to learn the lessons of the nursing process. In both studies, the effect of this method has been shown effective in the learning process. (17) Ahmadi concept maps as a tool in teaching - learning on student achievement and attitudes mentioned (18). Beheshtian et al concept maps as a new strategy for teaching - learning tool for assessing the implications of these chemicals (19). The paper utilizes Mehdi Zadeh et al study impact of education using concept maps in learning and retention of students in computer lessons in geology (20). Theoretically, the effect of concept mapping on learning characteristics can be raised based on learning Azoble because the concepts relate to each other by the actions and concept maps can be built can be part of a meaningful learning theory Azoble meet. On the other hand, in an attempt to build a conceptual map key concepts to be linked in some way to build cognitive learning.

If this happens, another part of the learning process needs to be meaningful. The concept mapping when students are subject, realize that there is a high correlation between concepts, so that the choice of words, concepts and relations between them are mentally challenged this leads to more and deeper learning (21) Because concept mapping as a learning strategy that offers the possibility to organize thoughts brief and sub- using key words and write seek time and this strategy, organizing the text to make plans or maps at first thought, so that learners can specify the text of the original concept, the ideas or concepts related to the original concept defines subsidiary, then these ideas (concepts) connected to the side of the original concept. It is the result of a plan or concept map above or under or around the middle and lateral thinking are. Concept mapping is required by users to organize and analyze information, identify key concepts, the visualization shows that they are related to them. (22)

The findings in relation to the second hypothesis (concept mapping, high levels of self-regulation have a positive impact on student learning in chemistry is the topic of atomic structure) showed the use of concept mapping in a significant effect on student learning has high levels of self-regulation. In agreement with these findings, research results Mih, show that the self-regulation concept mapping Tasyrmsbty students. In addition Chalarut and Dybaker, shows the concept map in groups have a positive impact on students' self-regulation. Also Rezai paper showed that self-regulated Learning Concept mapping, self-efficacy and cognitive strategies for effective nursing students (17) in the manufacturing process, concept maps, it is necessary to actively sweeping their conceptual understanding and the strategy employed to continuously monitor the behavior of the self-regulatory process, given the learners will increase. The advantage of using concept maps is that learners gain awareness of their cognitive and metacognitive processes. Haway, in a separate study suggests that concept mapping as a mirror of the cognitive structure. Learners not only with knowledge and conceptual drawings during their drawbacks but also be aware of learning strategies. Such diagnostic gives learners the opportunity to select the best strategy given learning situation (23). Hammond also provided a way to express the concept map.
building process students use self-regulatory strategies thereby helping them to develop critical thinking. Makes use of concept mapping to students' intellectually dishonest practices would correction and to process new information and to make it the priority (6 and 24) Based on the findings of this study suggest that, the effect of concept mapping on students' academic achievement and self-regulation should be considered in other courses. Also, due to limited resources and the researcher, research has been conducted on students in the second year of high school thus, according to the results of other studies suggested that the study be repeated at the base and different levels of education. As the use of concept maps makes learning more meaningful and increase the learners' motivation for learning chemistry it is recommended that teachers in the classroom to further exploit this method the test is based on the method for evaluating Azmtalb lesson learned by the learners use. Textbook authors also recommend this method and content of school curricula as possible to use.

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