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Maddenin Tanecikli Yapısının Anlaşılmasına Farklı Yöntemlerin ve Modellerin Etkisi*

Effecting of using different methods and Models on understanding the particulate nature of matter

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Extended Summary

Purpose

Understanding of the gas issues in chemistry is difficult for student because it shows intangible features, invisible, requires understanding at the molecular level (Demirer, 2009) and difficult to reconcile with daily life (Tüysüz, Tatar & Kuşdemir, 2010). In several research studies on gases, the use of different teaching methods and techniques has helped students to understand the issues at the micro level (Kaya, 2005; İpek, 2007; Yeşiloğlu, 2007). Teaching of the molecules, atoms and theoretical concepts with models and concrete materials are important for complete and accurate understanding of events in micro level by students (Çalık, Ayas & Ünal, 2006; Ebenezer, 2001; Jaber & Boujaoude, 2012; Johnstone, 1993; Özmen & Ayas, 2003; Philipp, Johnson & Yezierski, 2014; Raviolo, 2001). Also, cooperative learning that active learning methodis one of the teaching methods to eliminate misconceptions in point of increasing the students' individual and social skills in the process (Yavuz & Çelik, 2013). So, coadminstration of these method and technique is considered to facilitate the students' conceptual understanding. The purpose of this study was determining the effects of cooperative learning methods and models on the science education students' understanding of the particulate nature of gases.

Method

In this study was used quasi-experimental design with the inclusion of pre- and post-test. In this research were studied including two experimental groups [the first experimental group (İGÖ) that applied method of the Students Teams Achievement Divisions Technique (ÖTBB), the second experimental group (İMG) that the model used together (ÖTBB) and the control group.The sample was composed 79 first class science teacher education program students.Data was collected with the test of particulate nature of the gases that it consists of five drawing questions designed by researchs. The students were asked drawing in the particle size distribution of gases in five different states using questions. Before GMTYT was applied to students as pre-test, following it was applied as post-test after each group learning the course with their own methods and techniques.It was

used the mean and standard deviation analysis of for descriptive statistics and it was utilized one-way analysis of variance (one way ANOVA) for the significance analysis in the analysis of data.LSD test of multiple comparison tests and Games-Howell test were used in the event of significant differences between groups. The analysis were carried out on five questions at the outset, and then they were done on the questions bases separately.The students' drawing have been examined in detail, and then percentages was calculated for each question that collected as accurate and similar faulty drawings under categories. Hereby, students' miscopceptions have been identified regarding this topic, presented in tables and illustrated.

Results

There was a significant difference between groups as a result of ANOVA applied to the post-test ($p<0,05$). Performed LSD test showed that there is a difference in favor İMG between İMG and KG. While there is a significant difference between groups in the second and third questions, there is no significant difference in the first, fourth and fifth questions in the basic question. But, possessed misunderstanding of students in pre-test have decreased or have been ended in post-test.

Conclusion

Consequently, when model-based activities use with cooperative learning method, it helps to understand the granular structures of gases. It is believed that the abstract subject of granular structures of the matter is made of concrete, because students have found the opportunity to experience seeing and touching through models. It is recommended to teacher educators that directed teacher candidates for using the model activities for understanding of granular structures of matter and using these activities in primary education in teaching process.

Misconceptions students have been identified as it is associated the distribution of gases with their molecules masses, increase of number particles due to the resulting volume change with increasing temperature, gas molecules are mixed into separate atoms. Students misconceptions eliminated with this study largely, but there is no a significant different between groups in the post-test for some questions. The reason for this may be, the misunderstandings' change is difficult from correct ones in their mind that this misunderstanding has up to university level and it is required long-term studies.Besides, it may be effective to the short working time students with models.The students don't change to the misconceptions with correct concepts, it is difficult to convince them about it and it is required long-term and more comprehensive studies.

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