

## **Jigsaw Yönteminin Maddenin Tanecikli Yapısı Ünitesinin Öğretiminde Öğrenci Başarısına Etkisi\***

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Muhammet Ali Kılıç\*\*, Alev Doğan\*\*\*, Ümit Şimşek\*\*\*\*

### **Extended Summary**

#### **Purpose**

The aim of this study is to examine effect of jigsaw technique on 6th grade students' academic achievement in teaching the particulate nature of matter in science and technology course.

#### **Method**

In this study, pre-test and post-test control group was adopted as a quasi-experimental research design. The study was conducted on totally 70 6th grade students in 2012–2013 school term. The respondents in different classrooms were randomly classified as experimental (n=36) and control group (n=34). The data of the study were collected by means of Particulate Nature of Matter Academic Knowledge Test (PNMKT) for students to have prior knowledge on the particulate nature of matter lesson and after 12 week of application, Jigsaw Opinionnaire was used and PNMKT was reemployed to determine students' opinions on Jigsaw technique. In statistical analysis of PNMKT pre-test scores was used independent t-test while in statistical analysis of PNMKT post-test ANCOVA was applied. Independent t-test was employed for statistical analysis of PNMKT retention scores and statistical analysis of students opinions on the method used, frequency distribution was used.

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\*\* Öğretmen, Konya Millî Eğitim Müdürlüğü, Konya/ TÜRKİYE

\*\*\* Prof.Dr, Gazi Üniversitesi, Eğitim Fakültesi, İlköğretim Bölümü, Fen Bilgisi Eğitimi, Ankara/ TÜRKİYE

\*\*\*\* Doç.Dr, Atatürk Üniversitesi, Kazım Karabekir Eğitim Fakültesi, İlköğretim Bölümü, Fen Bilgisi Eğitimi, Erzurum/ TÜRKİYE tez çalışması ve bu çalışmanın raporlaştırılmasında katkıda bulunmuştur.

## **Results**

No significant difference was found between the average scores of 6 written exams given to the students in the experimental and control groups taking 5th grade science and technology course ( $t(68) = 0,17$  and  $p > .05$ ). This result suggests that students' achievement scores in science and technology prior to the present study are identical in the experimental and control group (Table 1). No statistically significant difference was found between the PNMAT pre-test scores of the group on whom cooperative learning method was conducted and of that to whom traditional learning method was administered ( $t(68) = 0,71$  and  $p > .05$ ) (Table 2). The average score of the experimental group was 20.55 while that of the control group was found 16.84 in accordance with the corrected post-test results.

3.71 point of difference is found between them. According to the results of ANCOVA conducted, this difference was statistically significant between PNMAT post-test average scores ( $F(1,67)=7.68$ ,  $p<.01$ ) (Table 3-4). The results of the independent t-test of the retention test average scores conducted 12 weeks after the practice by means of different teaching methods suggest that the average score that the students in the experimental group whom Jigsaw technique was conducted had in retention test was higher ( $X=18.78$ ,  $SS=4.95$ ) than that of the students in the control group ( $X=16.00$ ,  $SS=5.11$ ). This difference between the average scores is significant in favor of cooperative learning ( $t(68) = 2.308$ ,  $p<.05$ ) (Table 5). The average score of the control group students' opinions on Jigsaw technique is 61,03. Based on the fact that the maximum score to be received from the scale is 70, it can be stated that the students in Jigsaw group are positive about Jigsaw technique (Table 6).

## **Discussion, and Conclusion**

The finding that significant difference is found between the scores of PNMAT used as post-test given both to the experimental and control group in favor of the experimental group is supported by previous studies in the literature (Atasoy, Genç, Kadayıfçı and Akkuş, 2007; Maftai and Maftai, 2011; Tarhan and Sesen, 2012; Turaçoğlu, Alpat and Ellez, 2013; Özdilek et al, 2010; Sancı and Kılıç, 2011; Yıldırım and Girgin, 2012; Doğan et al, 2010). In addition, Cohen's d effect size of the teaching method used was measured. Effect size d is the difference between the practices divided by standard deviation (Cohen, 1988). The effect size of the teaching method adopted was found  $d=0.49$ . This effect size was interpreted as medium by Cohen (1988). In a study conducted by Hwang and Lin (2002) for the meta-analysis of 22 studies on cooperative learning in Taiwan, they found that cooperative learning had medium effect on student achievement ( $d= 0,3256$ ). This result shows similarity to the results we found. PNMAT retention test was conducted on the experimental and control group 12 weeks after the application. Significant difference was found in favor of the experimental group. This result is identical with the studies on the effect of cooperative learning on the retention of knowledge (Kozcu Çakır, Balliel and Sarıkaya, 2013; Yıldırım and Girgin, 2012; Ünlü and Aydın, 2011).

Jigsaw opinionnaire was conducted in order to learn about the opinions of the experimental group and the results stated that the students were generally positive about the method (Table 6). The same scale was applied by Şimşek (2007) and Uygur (2009) and similarly positive results were obtained. Similarly, in the research done by Turaçoğlu et al. (2013) on the effect of jigsaw technique on naming chemical components lesson, they found quasi-structured interviews with the students.

In conclusion, the particulate nature of matter lesson which every student at any educational level has certain misconceptions or difficulty in learning is taught in accordance with the activities conforming to Jigsaw technique and the method has been more successful in increasing their academic achievement level compared to traditional teaching methods. In addition, it was also found that Jigsaw technique has been more effective on the retention of knowledge compared to traditional teaching method. Moreover, the opinions of the students concerning Jigsaw technique were examined and they showed positive attitude toward the technique in terms of understanding lesson, interest in it, preparedness for the lesson while they were negative about it in terms of noise in the classroom, irresponsibility of the group members.