# ANALYZING IDEAS OF STUDENTS WHO STUDIED CHEMISTRY LABORATORY WITH RESPECT TO JIGSAW TECHNIQUE

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## Abstract

Aim of this study is to reveal the opinion of prospective elementary science teachers who studied chemistry laboratory with respect to jigsaw technique. Study is carried out with 23 students who are studying at elementary science education program. Study is carried out with respect to document analysis. Codes are represented in question topics. Themes could not be determined due to lack of detail on answers. It is revealed by the study careful planning and instruction will help students in development of both cognitive and affective skills. However failure on planning and instruction may have reverse effect

**Key Words:** Science Education, Jigsaw, Chemistry, Student Ideas, Laboratory

## KİMYA LABORATUVARI DERSİNİ BİRLEŞTİRME YÖNTEMİNE GÖRE ÇALIŞAN ÖĞRENCİLERİN GÖRÜŞLERİNİN İNCELENMESİ

### Özet

Bu çalışmanın amacı kimya laboratuvarı dersini birleştirme yöntemine göre çalışan öğrencilerin görüşlerini incelemektir. Çalışma Fen bilgisi eğitimi bölümünde öğrenim görmekte olan 23 öğrenciyle yürütülmüştür. Çalışmada doküman analizi yapılmıştır. Kodlamalar sorular içerisinde temsil edilmiştir. Temalar öğrenci cevaplarının yeterince detaylı olmamasından ötürü belirlenememiştir. Çalışma sonucunda dikkatli planlama ve öğretimin öğrencilerin bilişsel ve duyuşsal özelliklerinin gelişimine yardımcı olduğu ortaya çıkarılmıştır. Ancak planlama ve öğretimde oluşacak hatalar tam tersi sonuçlara yol açacaktır.

**Anahtar kelimeler**: Laboratuvar, Öğrenci Görüşleri, Kimya, Birleştirme, Fen Eğitimi

## 1. INTRODUCTION

Natural sciences rely on experiences and experiments more than social sciences thus different instruction techniques used often in order to achieve higher order thinking skills (Metin, Acisli and Kolomuc, 2012). However each student in the classroom has different type of learning style due to personal differences that an individual possess. For that reason modern techniques suggest different approaches for learning environments, for richer learning environment and support individual differences which are also a base that constructivist approach depends on (Daşdemir and Doymuş, 2012). Laboratory environments may be used for that purpose and teachers may help their students to understand the nature and nature of science (Wang, Stocker and Fu, 2012). Schools are the best places to support such approaches for the governments and through schools countries may finally have fulfil

the desire of having modern citizens who understand nature, nature of science and have scientific approach skills on every situation s/he encounters. Studies are done with respect to this perspective which also takes consideration of psychosocial developments (Nilsson and Driel 2010).

Language is one of the topics which place its role in education process and for that reason some methods are based on communication such as cooperative learning model. Although students have different characteristics and show different personalities yet they use the similar language and have tendency of showing similar approaches to experiences and conditions. Although they talk differently yet they can transfer their own experience to another however teachers may tend to use communicate in one way and may not communicate with students as they do with each other. Language is not only a key factor to enhance effects of learning environment but also is a tool for the students to help them to be more social person in a community (Okebukola, Owolabi and Okebukola, 2013). In cooperative learning environments students tend to show more responsibility and embrace that value. Physical differences in terms of race, genders etc. between the students just disappear and students learn to be leaders (Uzun, 2012). Those are not the only psychological developments that cooperative learning methods offer. Some studies show that method also helps students to develop positive feelings towards their environment, understand role of instructors and school management, increase in self confidence and reducing bullying (Bear et al, 2011). There are many techniques developed in cooperative learning model. One of them is Subject jigsaw technique which is first introduced by Doymuş (2007).

## 2. METHOD
### 2.1 Purpose of the study

Aim of this research is to reveal and investigate the ideas of teacher candidates who studied chemistry laboratory with Subject Jigsaw technique.

### 2.2. Research Design and Sample

Document analysis is used to reveal the data. To answer the purpose of the study three topics are determined. Seven questions were asked to students to collect data for the topics. To get the most in sight views students were asked to answer the questions anonymously. Only information were asked from the students were age and gender information. Sample of the study consist of the students who study at elementary science education program. Number and gender of the students is 14 girl 9 boys. Sample consists of 23 teacher candidates.

### 2.3. Data Analysis and its Implications

Hermeneutic analysis is done for data revealing and data coding is done with respect to empiric coding. Further analysis is done to determine themes however lack of details on answers did not put out a theme clearly yet analysis showed themes which might be assumed are also represented in topics. For that reason this study is based on topics and data revealing will be done through topics. Determined topics are "gaining of learning experiences" and "contribution of method".

It has been revealed by the data analysis that doing experiments help students to make connection theory with experience. For example a student responded questions as "I proved the theory" and another student responded as "I learned theory at lesson however I proved it in laboratory". It is also revealed by data coding that some students were afraid of that they would fail on experiments since they do not have clear understanding on theory yet doing experiments helped them to rationalize the theory as in "at first I was afraid however as the time passes my fear has

vanished". It is also noteworthy that students have expectation of examples related to daily life. For example a student answered questions as "we only did experiments which were written on the books, I was expecting some from daily life". Through those statements it is possible to say that doing experiments is a way of proving theory yet students still need more examples. Thus engaging students in daily life examples will enhance their understanding on theoretical knowledge.

Another point revealed by the study is, students are aware of themselves and the environment surrounding them. Most of the students indicated that "there are no enough materials in the laboratory" and there is even one student saying "through the course I was expecting myself as to be an individual who might help his/her environment and community and I can say that I am satisfied" while another student indicates same situation as "there has been undisciplined behaviours". Jigsaw method is useful for improvement both cognitive and affective skills and statements shown above are clear indication of that the method is working. Students are aware of themselves, their surroundings and materials. Even stating undisciplined or disorganized behaviours are also an indication of that method is a useful tool to increase awareness in such behaviours. This is also indicated in students' responses. For example, a student answered one of the questions as "it was some kind of intern preparing us to work life" which also signals that method is working on self awareness and gaining responsibilities. Gaining obtained through method is also recognized by the students and method is defined as "increasing self confidence". For that reason most of the students responded to question would you like to work with same method as "yes I would because it helped us a lot".

An interesting reveal of the data is shown in the questions is related to instructor. Most students indicated that although instructor is defined "fun" in teaching process s/he was not good enough in his/her teaching style. "not being equal to groups", "paying too much attention for some groups", "care for students and their learning but not paying attention to all students", "lesson was fun but did not pay attention on us as required/necessary enough". This situation led some students to think that teacher has favourite students or groups which in return may develop negative attitude towards teacher and hence towards course and school. Although there are some students who offered solution to the problem as "every group should have an instructor during laboratory session" is also an indication of those students are aware of the facts. Instructor may not have enough time for each group and thus may not reach everyone in the groups equally. Not being equal to students may make them tend to think negatively, because every student wants teacher attention on him/herself or his/her group. Efforts of teacher who try to help his/her students may in return have negative impact on students' feelings thus it is suggested that instructors should be careful on timing during lecture. Informing students that "instructor will be back for him/her". This will help students to realize that teachers are in fact do not have favourite students but they try to help every student. Otherwise it may be assumed that method will have a reverse effect on skills and attitudes.

## 3. CONCLUSION

Çetin and Akkus (2016) already discussed failure on implementing the method will prevent students to benefit from the jigsaw method. However with careful planning Yoruk (2016) indicates method will have success and hence students will benefit from it. Moreover lack of planning or instruction of the method may arouse negative feelings towards instructors. It is also possible to say that growing negative feelings may cause negative feelings towards course and school. Bear et. al, (2011) state that negative feelings may make students to have negative feelings towards themselves and their abilities. Furthermore negative feelings may even cause school drop outs. However from the student statements it is also clear that students benefit from jigsaw method on both affective and cognitive skills. Evcim and İpek (2013), Hedeen (2003), Troia et al. (2013) and Aksoy and Doymus

(2011) already point out different Jigsaw and cooperative learning methods help increase on cognitive and affective skills. For example along with academic success students are also aware of their surroundings and their potential. To sum up to benefit from the method it is crucial to make the planning carefully and then implement it to education environment.

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