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Application Of Subject Jigsaw Technique In Ducational Research

Eğitim Araştırmalarında Konu Jigsaw Tekniğinin Uygulanması

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ABSTRACT

The aim of this study is to ensure the correct applicability of the cooperative subject jigsaw technique in the lectures of the researchers. In the study, a general literature review was made about the Cooperative model. Then, the most frequently used methods of cooperative learning model in the lessons are given. The techniques used in the Jigsaw method, which is the most widely used in these methods, are mentioned. A literature review was conducted on the extent to which these techniques were used. The data obtained in the scan are presented as a Table. In the study, the cooperative subject jigsaw, one of these techniques, has been explained in different ways from other jigsaws. Then the subject is focused on how to apply jigsaw. Subject jigsaw application is carried out in four steps. The first of these steps is to create cooperative learning groups, the second is to determine the sub-topics; the third is the combination of the sub-topics and the fourth is the Exams. Each of these steps is explained in detail. In addition, the application has been made schematic so that researchers can understand it better. A sample application is included in our study. In this example application, necessary information is given by considering the jigsaw steps of what to do. In the conclusion part, it is mentioned in detail what the researchers will pay attention to.

Key words: Cooperative Learning, Jigsaw Techniques, Subject Jigsaw

ÖZET

Bu çalışmanın amacı araştırmacıların derslerinde İşbirlikli konu jigsaw tekniğinin doğru uygulanabilirliğini sağlamaya yöneliktir. Çalışmada önce İşbirlikli model hakkında genel bir literatür taraması yapılmıştır. Daha sonra işbirlikli öğrenme modelinin derslerde en sık kullanılan yöntemlerine yer verilmiştir. İşbirlikli yöntemler arasında en çok kullanılan Jigsaw yönteminde kullanılan tekniklerden söz edilmiştir. Bu tekniklerin ne ölçüde kullanıldığına dair bir literatür taraması yapılmıştır. Taramada elde edilen veriler Tablo olarak sunulmuştur. Çalışmada bu tekniklerden işbirlikli konu Jigsaw'ın diğer Jigsaw'lardan farklı yönleri izah edilmiştir. Sonra konu Jigsaw'ın nasıl uygulanacağı üzerinde durulmuştur. Konu jigsaw uygulaması dört basamaktan gerçekleştirilmektedir. Bu basamaklardan ilki işbirlikli öğrenme grupların oluşturulması, ikincisi alt konularının belirlenmesi, üçüncüsü alt konuların birleşimi, dördüncüsü ise uygulanan sınavlardır. Bu basamakların her biri ayrıntılı bir şekilde açıklanmıştır. Ayrıca araştırmacıların daha iyi anlayabilmeleri için uygulama şematik hale getirilmiştir. Çalışmamızda örnek bir uygulamaya yer verilmiştir. Bu örnek uygulamada neler yapılacağı, konu jigsaw basamakları göz önünde tutularak gerekli bilgiler verilmiştir. Sonuç kısmında araştırmacıların nelere dikkat etmeleri gerektiğinden ayrıntılı olarak söz edilmiştir.

Anahtar Kelimeler: İşbirlikli Öğrenme, Jigsaw Teknikleri, Konu Jigsaw

1. INTRODUCTION

We can say that the success of the students depends not only on the adequacy of the teachers, but also on their ability to apply modern teaching methods and techniques. It is important that the success of the learning process of the students is well known and that the teaching methods and techniques of the teachers are well known and that they implement these teaching methods and techniques. This increases the importance of methods and techniques by being student-centered rather than teacher-centered. Theoretical perspectives on learning with groups in student-centered teaching; Social context for learning is a fundamental feature of peer-mediated discussion approaches.

One of the more obvious theoretical perspectives on how students learn by interacting with others is based on socially constructive opinion (Geels, 2020; Jung, 2019). According to the social constructivist opinion; It develops on the interpersonal plane, where children's mental functions first learn to transform by internalizing the communication and interaction they have with others, gaining new understanding and different skills. At the heart of this view is that children learn by interacting with adults or their more skilled peers who support or mediate learning so that they can complete tasks they cannot do alone. When children work together in cooperative group tasks; is aware, directed, reminded and willing to ask for help from other group members, the perceived need for assistance (Azizan, Mellon, Ramli, & Yusup 2018; Gillies & Ashman 1998; Grenier & Yeaton 2019). In addition, as children interact in group work, their thinking, reasoning and problem solving skills develop. It is important that they model each other and get a chance to build new understandings, knowledge and skills, both academically and socially, as a result of their study of the learning process (Kimmelmann & Lang, 2019).

In the studies carried out; during the cooperative group work, teachers were investigated for using certain cognitive and cognitive inquiry strategies to facilitate students' discussion, thinking and learning. Difficulties can arise in cooperative learning due to the lack of a clear understanding of how teachers can create effective cooperative groups, research and theoretical perspectives on the application, and how to translate knowledge into practical classroom practices. Teachers' reluctance to embrace cooperative learning can also be due to the lack of time to learn about peer-brokered approaches. The fact that they think they may have difficulties in controlling the teaching and learning process, the demands on organizational changes within the classroom, the lack of professional competence necessary to continue the process are again five-factors (Cohen, Brody, & Sapon-Shevin, 2004). The teacher's role in implementing cooperative learning in the classroom provides a comprehensive overview of these issues. In many departments, there is no clear explanation of how Cooperative learning practices can be made to classroom studies. In cooperative learning, all students need to learn and work in environments where their individual strengths are recognized and their individual needs are met. Today, many educators try to ensure that multi-intelligence theory and differentiated teaching are included in the studies (Akhavan 2014). All students need to learn in a supportive community to feel safe enough to take risks (Sapon-Shevin 1996; Sapon-Shevin, & Zollers, 1999). Cooperative learning arrangements have been found to be useful for improving success, encouraging student participation, and increasing motivation for learning (Polloway, Patton, & Serna, 2001).

One of the goals of Cooperative learning is to disrupt typical hierarchies about who is "smart" and who is not (Veldman, Doolaard, Bosker, & Snijders 2020). It has been determined that social status issues often play a role in reproducing Cooperative learning activities in taking certain steps to change this perception. Cooperative learning allows all students to work together, each student to experience the role of teacher and learner, and to model each student's respect for many different skills and learning styles. Limited knowledge about Cooperative learning in the literature, lack of methods in teacher education; There are studies that reveal the specific challenges teachers face when implementing Cooperative learning, including challenges related to group management, organization, time management, curriculum design and evaluation (Liebech-Lien, 2020; Buchs, Filippou, Pulfrey, & Volpé, 2017; Ghaith, 2018). The traditional teaching structure, in which the whole class teaches together and individual tasks are performed, is still widely used (Gillies & Boyle, 2010). Leaving this traditional teaching method and incorporating cooperative learning into their classrooms requires teachers to significantly change teaching practices and learn new skills. Teacher who applies cooperative learning; facilitate, teach cooperative skills and design structured learning activities for cooperative learning (Sharan, 2010). Reasons why teachers or students are uncomfortable with cooperative learning include adopting a particular technique without fully understanding the basic principles and not having enough support to implement creative, multi-level cooperative learning activities that allow students to participate at different levels. One of the most important problems of cooperative learning practitioners is that they have difficulty determining exactly which cooperative learning methods and techniques to apply to which study (Liebech-Lien, 2020).

The most commonly used cooperative learning methods in classrooms are: (Johnson, Johnson, Stanne (2000) Complex Instruction (CI), Constructive Conversation (CC), Common Integrated Reading and Composition (CIRC), ooperative Structures (CS), Group Investigation (GI), Jigsaw, Learning Together (LT), Student Teams Achievement Departments (STAD), Teams-Games-Tournaments (TGT) and Team Supported Individualization (TAI). On the other hand, researchers who have been working on the cooperative jigsaw method have doubts about which jigsaw technique to apply. Because when we look at some studies, it is seen that there is a mismatch between the jigsaw technique applied and the main application directive of that technique. Six jigsaw techniques are applied in scientific studies. The techniques applied are: Jigsaw I, developed by Aronson (1978), Jigsaw II, developed by Slavin (1980), Jigsaw III developed by Stahl (1994), Jigsaw IV developed by Holliday (2000), Reverse Jigsaw developed by Hedeen (2003) and Subject Jigsaw developed by Doymus (2007).

2. METHOD

2.1. Research model

In the study, introductory research method was used from research methods. This method is a type of research that aims to reveal some of the characteristics of a particular set of information that are of interest. The purpose of introductory research is not to observe cause and effect relationships, but to determine the general characteristics of situations or events (Lesbos & Atici, 2019).

2.2 Subject jigsaw application

Since the applications of jigsaw techniques are very similar, most researchers have difficulties during the application. In this article, the topic developed by Doymus (2007) will be explained in detail how to apply jigsaw. The implementation of subject Jigsaw consists of four steps: (1) creating cooperative learning groups, (2) determining subtopics, (3) a combination of subtopics, and (4) exams. These steps will be detailed with a brief overview followed by examples.

2.3. Cooperative learning groups

Creation of cooperative groups: The researcher or teacher determines groups of 2-6 students taking into account the number of students in the class. It creates heterogeneous groups taking into account the level of knowledge of the students assigned to the groups for academic success. It then provides general information about what to do in the working process of the groups. When necessary, each group determines the group presidents, group server, and group printers. It is also said that all students in the groups will actively participate in the learning process.

2.4. Determination of subtopics

Subtopics of the course unit to be studied; divided into sections as the number of cooperative groups created in the class or study. If there are too many cooperative groups, two groups can be given a subtopic. In addition, if the number of subtopics is greater in the number of groups, the sub-topics can be merged into a single subtopic. Subtopics given to groups are tried to be learn by the group students. Materials related to subtopics are presented to the students by the teacher. General information about how to work with subtopics is given. After the topics learning process, groups are told that they will be subjected to oral or written examination.

2.5. Merged subtopics

As shown in Figure 1, after the learning of the first subgroups is finished, the subgroups are merged into 2 or 3 each. Students in the cooperative group work on these merged subtopics again. After the work process is finished, groups of students in the merged subtopics are relocated. After the changing groups run new subgroups, all groups are merged into units. Groups work on these merged topics again. After the learning process is finished, the server in each group summarizes the unit.

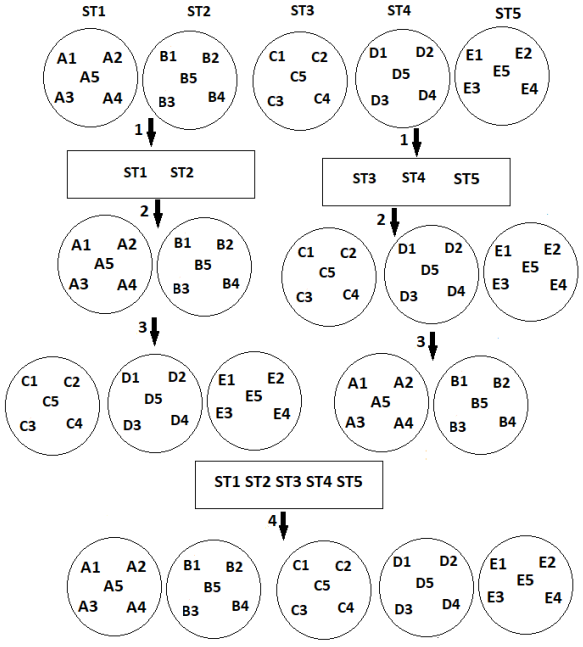

Figure 1. Subject jigsaw application scheme (ST subtopics, Letters represent students)

2.6. Exams

Exams are conducted in 3 ways.

1) Module test: Members of each group take this test individually. The questions of the test are usually open-ended. Module tests are designed to create 4 questions on each subtopic. The aim is to determine which subtopic students are inadequate.

2) Academic Achievement test: The questions of this test should already be selected. The questions of the test are prepared to form the entire unit. The purpose of this test is to determine the extent to which the students have mastered the unit in the direction of knowledge.

3) Interview test: This test randomly selects two students from each group and asks questions about subtopics. The purpose of this test is to; to determine the self-esteem, level of knowledge and oral expression of the students. Test results are evaluated into two dimensions: personal basis and group basis. The group that succeeds on a group basis is rewarded.

2.7. Exemplary work

How to apply the cooperative Subject Jigsaw to the movement and force unit of the physics course taught in the 9th grade of high school is explained in detail in Table 1.

Table1. A sample study of the subject jigsaw application

Sample Work Plan	
Name of the unit:	Motion and force
Number of students in the class:	20
Class grade level:	High school 9th grade
Application time:	4 week
1. Creation of Cooperative Groups	
When there are four subtopics, divide the class into four cooperative heterogeneous groups, each consisting of five students. In order to create groups, apply a Preliminary Knowledge Test to the students or take into account the course achievement grades they have taken in the previous semesters. Group 1 (A1, A2, A3, A4, A5) Group 2 (B1, B2, B3, B4, B5) Group 3 (C1, C2, C3, C4, C5) Group 4 (D1, D2, D3, D4, D5)	
2. Determination of subtopics (working time of groups 1 Week)	
First Subtopics: "Motion topics", group working on these topics (A1, A2, A3, A4, A5) Second Subtopics: Group working on these topics "Force topics" (B1, B2, B3, B4, B5) Third Subtopics: "Newton's Laws of Motion topics" group working on these topics (C1, C2, C3, C4, C5) Fourth Subtopics "Friction Force topics" group working on these topics (D1, D2, D3, D4, D5)	
3. jigsaw subtopics (groups uptime 2 Weeks)	
Week 1: “Motion topics + Force topics” Groups working on these topics (A1, A2, A3, A4, A5) and (B1, B2, B3, B4, B5) “Newton's Laws of Motion topics" + Friction Force topics” Groups working on these topics (C1, C2, C3, C4, C5) and (D1, D2, D3, D4, D5) Week 2: intergroup relocation " Motion topics" + "Force topics" groups working on these topics (C1, C2, C3, C4, C5) and (D1, D2, D3, D4, D5) "Newton's Laws of Action topics" + "Friction Force topics" are groups working on these issues (A1, A2, A3, A4, A5) and (B1, B2, B3, B4, B5)	
4. Merging all subtopics (groups uptime 1 Week)	
"Movement topics" + "Force Topics"+ "Newton's Laws of Motion Topics" + "Friction Force Topics" groups working on these issues (A1, A2, A3, A4, A5), (B1, B2, B3, B4, B5), (C1, C2, C3, C4, C5) and (D1, D2, D3, D4, D5)	
5. Exams	
1. Before merging subgroups, the module for that subtopic is tested after the end of the subtopic that each group has played. 2. At the end of the merger of all subtopics, all students who finish the topics are given an academic achievement test containing the unit topics. 3. In each group, 2 students are interviewed about the application of the method.	

3. RESULT

By the researchers; Information on the use of Jigsaw techniques in researches from the date they were developed to the present day is given in Table 2.

Table 2. Number of researches and citations from the date jigsaw techniques were developed to the present day

	Jigsaw I	Jigsaw II	Jigsaw III	Jigsaw IV	Reverse Jigsaw	Subject Jigsaw
1978-2022	1590					
1986-2022	-	4600				
1994-2022	-	-	476			
2000-2022	-	-	-	605		
2003-2022	-	-	-	-	309	
2007-2022	-	-	-	-	-	126

Looking at the values in Table 2; Jigsaw techniques have been used in high numbers in scientific studies over the years. In some of the articles examined in the table results, it is seen that there is no compatibility between

the name of the Jigsaw technique and the way it is applied. These articles are not named here. As with other techniques, it is seen that the application directive of the technique is not followed in the studies carried out by applying the subject Jigsaw technique.

4. CONCLUSIONS AND RECOMMENDATIONS

Although jigsaw techniques have many things in common with each other, each technique has its own distinctive, distinctive aspects. Researchers applying Jigsaw techniques have been found to be inaccurate or incomplete, especially the Subject Jigsaw, reverse Jigsaw and Jigsaw IV techniques. In fact, in some studies, it can be said that the application diagrams and application contents are very different from each other and are completely incompatible with the Jigsaw technique used. In this study, the subject is explained in detail how to carry out the implementation of jigsaw. Subject Jigsaw's cooperative learning method can be used effectively at most course and class levels. It not only improves the motivation and performance of students, but also improves their social skills for group work. Unlike other jigsaw techniques, the subject Jigsaw application appears to be easier and more effective for both practitioners and students. However, the teacher should be careful when addressing the needs and interests of individual participants. Teachers are advised to show a certain degree of flexibility in configuring heterogeneous groups so that students can learn from each other when creating cooperative groups. The subject that the researchers will apply in their studies is to give the necessary information about jigsaw technique to the application students in advance and to explain the step-by-step application process. It is also important that students are informed about how to evaluate success at the end of the process. If this is not done, students in the groups may experience negative situations such as waste of time, non-performing group tasks, individual work, etc. during the implementation process because they do not know how the process will go. Another point that researchers will pay attention to in Subject Jigsaw is that as indicated by arrows 2 and 3 in Figure 1, the learning process should be kept long since the groups change places during the combining process of the subjects. Because the main learning steps of the subjects take place in this part. Another issue that researchers will pay attention to is the scores that the students got from the Module test of the subtopics they studied. If the subtopics does not receive enough points, that group needs to work on that subtopics again. Merging of subtopics should not be allowed before the knowledge levels of subtopics are completed. At all stages of combining the subtopics, the teacher should continue to provide students with any necessary guidance. Students should transfer the necessary information in the parts where they have difficulty.

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