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STUDENTS' OPINIONS ABOUT THE EFFECT OF THE APPLICATION OF LEARNING TOGETHER AND GROUP INVESTIGATION METHODS AT DIFFERENT INTERVALS ON THE FEATURES OF COOPERATIVE LEARNING MODEL

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ABSTRACT

The aim of this study was to investigate the effects of the applications of learning together and group investigation methods at different intervals on the features of cooperative learning model. The study sample comprised the sixth, seventh and eighth grade students studying in a public middle school. In the first year of the application, continuing for two years, this study was conducted with sixth and seventh grade students and in the second year, a year later, the same students who graduated to the seventh and the eighth grade and an additional seventh and eighth grade class that had not participated before were included in the study**.** In the experimental groups, classes were applied Learning Together and Group Investigation methods. The data collection tool used was Cooperative Learning Model Opinion Scale. According to the findings obtained by the scale, the effectiveness of Learning Together and Group Investigation methods were determined by the experimental design applied. In general, it can be said that applying of the methods twice in two years has developed the features of the cooperative learning model.

Keywords: *cooperative learning model, elementary science education, group investigation method, learning together method.*

INTRODUCTION

In today's education, constructivist learning theories have preferred that individual's direct knowledge in their minds is made by interacting with the environments they live in and with other individuals in this environment (Özkılıç, 2011; Matthews, 2002; Schunk, 2011; Zorlu, 2016). In constructivist learning theories, environments in which individuals share and query opinions in a constructive and critical way and take an active role in jointly discovering meaning in social interaction are used (Çakıcı, 2012; Köseoğlu & Tümay, 2015).

Cooperative Learning Model

Like the constructivist approach, the cooperative learning model is also one of the models that convert the process from outcome-content-oriented teaching to process-oriented teaching by actively including the students in the learning environment (Sharan, 2015). According to Johnson and Johnson (1992), cooperative learning should involve positive dependence, individual responsibility, face-to-face interaction, use of social skills, and forming groups and a group mind. Thanks to the cooperative

activities, students who engage in the course tools with their peers learn in a more effective way, and their response strategies are improved depending on an increase in the permanency of their knowledge (Johnson & Johnson, 1986; Johnson, Johnson, & Holubec, 1994).

The cooperative groups are formed by the teacher in a heterogeneous structure by taking into consideration the gender, interests, social, economic conditions and especially the achievement of the students (Bayrakçeken, Doymuş, & Doğan, 2013). Studies of individuals with different characteristics to achieve shared goals by creating a group are very important in terms of gaining interpersonal and group skills. Within the group, the students act as a group to maximize their own and each other's learning. All members of the group work for the achievement of each member (Macpherson, 2015). In this way, the group spirit is formed and the members of the group act in a collective consciousness.

Learning realized in face-to-face interaction becomes more effective and efficient when the group members help each other by encouraging and supporting each other (Doymuş & Doğan, 2011; Panitz, 1999). In order for to learn a subject or fulfil a responsibility in the cooperative group, each member in the group must fulfil their responsibilities and learn the subject to which they are responsible (Laal, Laal, & Kermanshahi, 2012). In the principle of positive interdependence, each student must know that they should contribute to the group to the best of their capacity. Students that are competing with their group friends must be in cooperation and have solidarity with their group of friends (Yılar, 2015). With positive interdependence, students could progress more successfully by helping each other towards a common goal (Gök, Doğan, Doymuş, & Karaçöp, 2009). In addition, this increases the group harmony, which includes social factors such as mutual trust and sincerity as well as the sense of belonging to a group (Strijbos, Martens, & Jochems, 2004).

The members of the group should sit close enough to see each other mutually and not to disturb the other groups. In the classroom, which is organized in such a way as to ensure the easy transition of students from one group to another, the teacher may easily be interested in groups (Johnson, Johnson, & Holubec, 1994). Successful cooperative learning practices focus on the direct provision of instructions by the teacher to help the student in communication, decision making and conflict resolution (Johnson & Johnson, 1999). Sharing the study area and materials is extremely useful for the development of social skills (Ransdell, 2003). This helps to include individuals whose social skills are underdeveloped in a group and to tell them that they need to cooperate. However, this does not guarantee that those individuals will cooperate effectively. Leadership, decision-making, trust building, communication and conflict management skills should be taught in a desired and complete sense of academic skills to individuals (Bay & Çetin, 2012).

During cooperative learning activities, the researchers have developed many techniques to create a positive learning environment and to contribute to students' success (Colosi & Zales, 1998; Hines, 2008; Panitz, 1999). Among them, the most common are Learning Together (LT) and the Group Investigation (GI) methods. There are a number of studies that have used these methods. These studies were conducted considering not only students' academic achievement but their attitudes (Nama & Zellner, 2011), social interactions (Altun, 2015; Ebrahim, 2012), communicative skills (Kasap, 1996; Topping, Thurston, Tolmie, Christie, Murray, & Karagiannidou, 2011), science process skills (Azar, 2008; Bozdoğan, Taşdemir, & Demirbaş, 2006), macro- and micro-comprehension (Alyar & Doymuş, 2015; Şimşek, Doymuş, Doğan, & Karaçöp, 2009), laboratory practice skills (Bıyıklı, 2015) and contributions to scientific writing (Bahadır, 2011). Studies have also made comparisons between different techniques and one-time implementations.

The aim of this study is to investigate the effects of the applications of learning together and group investigation methods at different intervals on the features of cooperative learning model. The researcher believes that this procedure will enable a more comprehensive and detailed demonstration of applications made in different intervals using the Cooperative Learning Model in addition to pre-existing results in the literature related to aspects of the model.

RESEARCH QUESTION

1. What are the effects of the application of learning together and group investigation methods at different intervals on the features of cooperative learning model?

METHOD

Research Design

Cooperative studies have become even more important, with its advantages to science education (Wolfensberger & Canella, 2015). However, some difficulties have been faced while applying these methods in studies. It has been thought that due to performing the applications over short periods of time, their efficiencies cannot be revealed completely (Bayrakçeken, Doymuş, & Doğan, 2013). Applying the cooperative learning model to the same sample group at different times allow researchers to observe its efficiency better. In this respect, the Solomon research design, which is the revamped and developed version of the design used with the control group allows the researcher to perform the applications with more groups. It also allows for more comparisons to be made (Babbie, 2013; Solomon, 1949). Therefore, studies which are conducted using the Solomon research design can obtain results with internal and external validity remaining intact by removing the effect between application and test (Karasar, 2016; Neuman, 2014; Solomon, 1949).

In the first year, the study was implemented using Solomon Experimental Design. The first implementation was made with four student groups (two experimental groups and two control groups). In the second year, the researcher created a semi-experimental design by revising the Solomon experimental design. This semi-experimental design included an additional experimental group that had not participated in the first implementation. The purpose of the additional experimental group was to show the difference between the students who studied with the method twice and those who did so only once. Therefore, the second implementation created a semi-experimental design that included two control and three experimental groups and enabled two implementations (Figure 1).

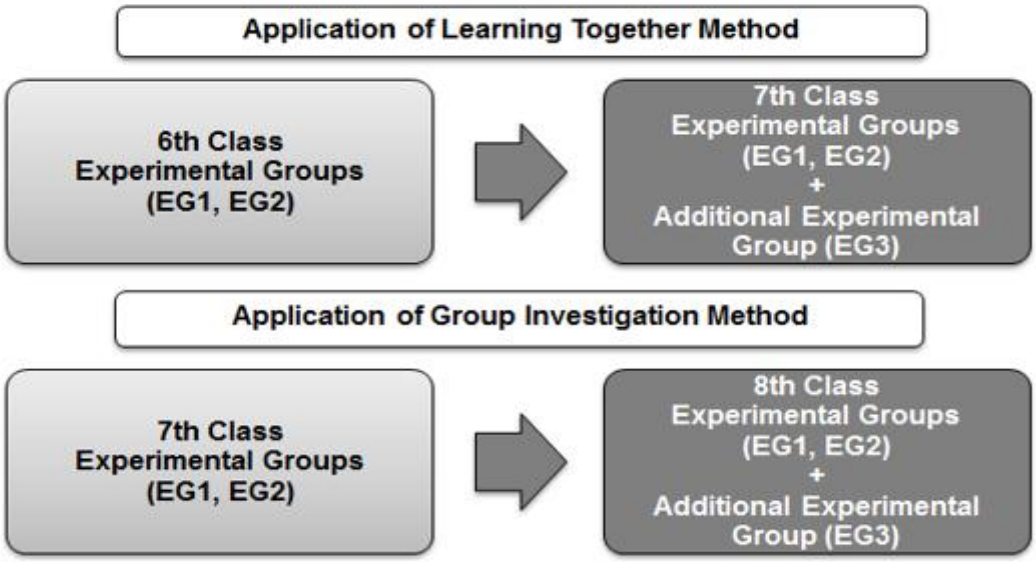

Figure 1. Application design of research

In Application-1, which is the first year of the study, the application of the learning together (LT) method to the experimental groups in the sixth grade and group investigation (GI) method to the

experimental groups in the seventh grade started. In Application-2, which is the second year of the study, the same methods are applied to the same groups who graduated to the next grade. Moreover, in the second year, one experimental group was added to both LT and GI methods to have a group in which the method was used for the first time (Figure 1).

Sample

A sample of sixth, seventh and eighth grade students from a public middle school was selected using simple random sampling. In the first year, two classes in sixth and seventh graders participated in the first application. In the second year, three classes in seventh and eighth graders participated in the second application (Table 1).

Table 1
The sample of the study

Method	Application-1	Application-2
LT	53 students (20 Female and 33 Male)	75 students (30 Female and 45 Male)
GI	55 students (22 Female and 33 Male)	72 students (31 Female and 41 Male)

The Cooperative Learning Model Opinion Scale (CLMOS)

Taken from Doymuş (2012), the Cooperative Learning Model Opinion Scale (CLMOS) consists of eight items prepared for the features of the cooperative learning model.

Application of Learning Together and Group Investigation Methods

Practices were carried out at the sixth, seventh and eighth grade levels within the scope of the "Matter and Change" subject learning area.

Learning together method (LT). The researcher formed heterogeneous groups consisting of four or five students, according to preliminary information test at EG1 and according to students' grade in the science course and their teacher's opinion in the first year at EG2. Groups were organized by considering the conditions for cooperative learning. Groups were allowed to conduct research on the units "Matter and Heat" for the sixth grade both inside and outside the classroom. All the members were prepared to learn the unit together. After the work was completed, a handwritten report was printed to the groups. When the group work on one topic of the unit was finished, the group that will present their work among all groups in the class was determined. After the presentations, the classroom evaluations were made. The other topics of the unit were processed in the same way. Finally, CLMOS were administered. The second year, an additional group (EG3) was added. Heterogeneous groups of EG3 were constructed according to preliminary information test. The second year, EG1, EG2 and EG3 were application to the same method in "Structure and Features of the Matter" unit. At the end of the years, CLMOS were administered.

Group investigation method (GI). In the first year, the classes were divided into two parts: PART 1 and PART 2. The researcher formed heterogeneous groups consisting of four or five students, according to EG1 to preliminary information test and EG2 to their course grade in the science course and their teacher's opinion in the first year. Groups were organized by taking into consideration the conditions for cooperative learning. Groups were allowed to conduct research on the units "Structure and Features of the Matter" the seventh grade, both inside and outside the classroom. The number of groups to be presented was determined by considering the time. In the class hour, two groups were identified with each group checking each other's part. One group made their presentations while the other group checked them and tried to fix the parts they found to be wrong. After the presentations, classroom evaluations were then made. The other topics of the unit were processed in the same way.

Finally, CLMOS were administered. In the second year, an additional group (EG3) was added. Heterogeneous groups of EG3 were constructed according to preliminary information test. EG1, EG2 and EG3 were application to the same method in the second year. At the end of the years, CLMOS were administered.

Analysis

Descriptive analysis was performed using the data obtained from CLMOS. The data of this study was analysed using a Chi-square analysis.

FINDINGS

The descriptive analysis of the data obtained from the CLMOS is given in Tables 3-10.

Table 2
Students' opinions on studying in cooperative groups

Method / Opinions	Learning Together (LT)					Group Investigation (GI)				
	Application-1		Application-2			Application-1		Application-2		
	EG1	EG2	EG1	EG2	EG3	EG1	EG2	EG1	EG2	EG3
Pleasurable	4.32	4.80	4.68	4.76	3.91	4.32	4.26	4.52	4.65	4.04
Informative	**4.65**	**4.71**	**4.79**	**4.48**	**3.96**	**4.21**	**4.48**	**4.56**	**4.60**	**4.08**
Useful	4.65	4.65	4.75	4.48	3.96	4.46	4.48	4.59	4.70	4.00

Note: Findings were given on the average above 5 points. Application-1: First time application, Application-2: Second time application.

It is seen that the students in EG2 stated that the method was more "pleasurable" than the students in EG1 in the application-1 of LT method. It is seen that the students' opinions in both groups are equivalent to the "informative" and "useful" in the application-1 of LT method (Table 2). It is seen that the students' opinions in both groups are equivalent to the "pleasurable", "informative" and "useful" in the application-1 of GI method (Table 2). In addition, the chi-square test analysis was performed on the data obtained from the application-1 of the LT and GI methods. The data analysis showed that there was no statistically significant difference between groups as a result of the chi-square test applied to data received from the once application of LT method, Pleasurable: $X2(4, n=51)=5.86$, $p>0.05$; Informative: $X2(3, n=51)=0.88$, $p>0.05$; Useful: $X2(3, n=51)=1.59$, $p>0.05$ and GI method, Pleasurable: $X2(4, n=55)=4.35$, $p>0.05$; Informative: $X2(3, n=55)=4.45$, $p>0.05$; Useful: $X2(3, n=55)=2.63$, $p>0.05$. In the application-2 of LT and GI methods, it was observed that the students' opinions at the EG1 and EG2 were more "pleasurable", more "informative" and more "useful" than at the EG3 (Table 2). The chi-square test analysis was performed to see if this difference is statistically significant. According to the results of the chi-square test, when applying LT method twice, it was found that there is a statistically significant difference among groups in the characterization items of "Pleasurable" and "Informative" in favour of EG1 and EG2, Pleasurable: $X2(8, n=75)=19.44$, $p<0.05$; Informative: $X2(6, n=75)=16.67$, $p<0.05$. According to the chi-square test result, when applying GI method twice, it was found that there is a statistically significant difference among groups in the characterization items of "Pleasurable" and "Useful" in favour of EG1 and EG2, Pleasurable: $X2(4, n=72)=14.03$, $p<0.05$; Informative: $X2(6, n=55)=9.55$, $p>0.05$. From the results regarding working in cooperative groups, it can be concluded that applying LT method twice was more pleasurable and informative, while applying GI method twice was more pleasurable and useful.

Table 3
Students' opinions on studying in cooperative groups with their friends

Method / Opinions	Learning Together (LT)					Group Investigation (GI)				
	Application-1		Application-2			Application-1		Application-2		
	EG1	EG2	EG1	EG2	EG3	EG1	EG2	EG1	EG2	EG3
Very Good	46.4	73.9	57.2	44	59.1	64.2	59.3	51.9	60	40
Good	**39.3**	**17.4**	**32.1**	**48**	**13.6**	**17.9**	**33.3**	**44.4**	**30**	**44**
Enough	3.6	8.7	10.7	4	4.5	3.6	0	3.7	5	8
Not Good	**7.1**	**0**	**0**	**4**	**4.5**	**14.3**	**3.7**	**0**	**5**	**8**
Very Bad	3.6	0	0	0	18.2	0	3.7	0	0	0

Note: Findings were given on the percentage. Application-1: First time application, Application-2: Second time application.

In the application-1 of LT and GI methods, and the application-2 of GI method were equivalent to the students' opinions on studying in cooperative groups with their friends (Table 3). In addition, the chi-square test analysis was performed on the data obtained from the application-1 of LT and GI methods, and the application-2 of GI method. There was no statistically significant difference between groups according to the chi-square test applied to data received the application-1 of LT method, $X2(4, n=51)=5.86$, $p>0.05$ and GI method, $X2(4, n=55)=5.04$, $p>0.05$ and the application-2 of GI method, $X2(6, n=55)=4.13$, $p>0.05$. In the application-2 of LT method, it was observed that the students' opinions at the EG1 and EG2 were more "very good" and more "good" than at the EG3 on studying in cooperative groups with their friends (Table 3). The chi-square test analysis was performed to see if this difference is statistically significant. According to the results of the chi-square test that was applied to data which was obtained by applying LT twice, this study determined a statistically significant difference among groups, $X2(8, n=75)=15.97$, $p<0.05$. It can be said that at the end of the second-year application, most of the students at the EG1 and EG2 had more positive opinions on working together in comparison to students at the EG3. The improvements of the students at the EG1 and EG2 showed that the opinions of the students at the EG1 positively improved when compared to their opinions after the first-year application. According to the study findings, it can be said that most students in the groups had opinions of "good" and "very good" on working with their friends in cooperative groups after the second-year application.

Table 4
Students' opinions as a result of cooperative group activities

Method / Opinions	Learning Together (LT)					Group Investigation (GI)				
	Application-1		Application-2			Application-1		Application-2		
	EG1	EG2	EG1	EG2	EG3	EG1	EG2	EG1	EG2	EG3
I understood the course subject.	4.66	4.84	4.75	4.24	4.23	4.11	4.22	4.33	4.75	4.16
My self-confidence has increased.	**4.52**	**4.72**	**4.64**	**4.44**	**4.28**	**4.25**	**4.26**	**4.49**	**4.75**	**4.00**
My thought horizon has been greatly broadened.	4.67	4.76	4.75	4.28	4.20	4.25	4.00	4.44	4.65	4.12
I have become a person who can perform an action on his/her own.	**4.60**	**4.73**	**4.61**	**4.60**	**4.23**	**4.18**	**4.04**	**4.56**	**4.70**	**3.96**

Note: Findings were given on the average above 5 points. Application-1: First time application, Application-2: Second time application.

In the application-1 of LT and GI methods were equivalent to the students' opinions on the results of cooperative group activities (Table 4). In addition, the chi-square test analysis was performed on the data obtained from the application-1 of the LT and GI methods. This study was determined that there was no statistically significant difference between groups as a result of the chi-square test applied to data received from the first application of LT method, I understood the course subject: $X^2(1, n=51)=2.56$, $p>0.05$; My self-confidence has increased: $X^2(2, n=51)=2.03$, $p>0.05$; My thought horizon has been greatly broadened: $X^2(2, n=51)=2.22$, $p>0.05$; I have become a person who can perform an action on his/her own: $X^2(2, n=51)=0.70$, $p>0.05$, and GI method, I understood the course subject: $X^2(4, n=55)=4.77$, $p>0.05$; My self-confidence has increased: $X^2(4, n=55)=5.94$, $p>0.05$; My thought horizon has been greatly broadened: $X^2(4, n=55)=7.63$, $p>0.05$; I have become a person who can perform an action on his/her own: $X^2(4, n=55)=4.36$, $p>0.05$. In the application-2 of LT and GI methods, it was observed that the students' opinions at the EG1 and EG2 were more than at the EG3 on the results of cooperative group activities (Table 4). The chi-square test analysis was performed to see if this difference is statistically significant. According to the results of the chi-square test that was applied to data which was obtained by applying LT twice, this was study determined that there was a statistically significant difference among groups in the characterization item of "My thought horizon has been greatly broadened", $X^2(6, n=75)=15.10$, $p<0.05$. According to the results of the chi-square test which was applied to data obtained by applying GI twice, this was study found a statistically significant difference between groups in favour of the EG1 and EG2, I understood the course subject: $X^2(4, n=72)=15.29$, $p<0.05$; My self-confidence has increased: $X^2(4, n=72)=12.187$, $p<0.05$; My thought horizon has been greatly broadened: $X^2(4, n=72)=15.81$, $p<0.05$; I have become a person who can perform an action on his/her own: $X^2(4, n=72)=14.92$, $p<0.05$. The study results were showed that the students' thought horizon broadened as a result of applying LT and GI methods twice. Moreover, it can be stated that applying GI method twice also had an effect on students' understanding of the course subject, by improving their self-confidence and enabling them to become a person who can perform an action on his/her own.

Table 5
Students' opinions on their study efforts in comparison to their friends' study efforts in a cooperative group

Method	Learning Together (LT)					Group Investigation (GI)				
	Application-1		Application-2			Application-1		Application-2		
Opinions	EG1	EG2	EG1	EG2	EG3	EG1	EG2	EG1	EG2	EG3
Very Good	60.7	65.2	78.6	60	59.1	46.4	41.2	55.6	60	24
Good	**28.6**	**26.1**	**14.3**	**32**	**18.2**	**35.7**	**44.4**	**29.6**	**40**	**56**
Enough	10.7	4.3	7.1	4	13.6	14.3	14.4	14.8	0	20
Not Good	**0**	**0**	**0**	**4**	**0**	**3.6**	**0**	**0**	**0**	**0**
Very Bad	0	4.3	0	0	9.1	0	0	0	0	0

Note: Findings were given on the percentage. Application-1: First time application, Application-2: Second time application.

In the application-1 of LT and GI methods, and the application-2 of LT method were equivalent to the students' opinions on their study efforts in comparison to their friends' study efforts in a cooperative group (Table 5). In addition, the chi-square test analysis was performed on the data obtained from the application-1 of the LT and GI methods. There was no statistically significant difference between groups according to the chi-square test applied to data received as a result of applying LT method, $X^2(3, n=51)=2.56$, $p>0.05$, and GI method once, $X^2(3, n=55)=1.35$, $p>0.05$ and LT twice, $X^2(4, n=75)=3.25$, $p>0.05$. In the application-2 of GI method, it was observed that the students' opinions at the EG1 and EG2 were more than at the EG3 on their study efforts in comparison to their friends' study efforts in a cooperative group (Table 5). The chi-square test analysis was performed to see if this difference is statistically significant. According to the results of the chi-square test which was applied to data obtained by applying GI twice, this study was determined that there was a statistically significant difference among groups in favour of the EG1 and EG2, $X^2(4, n=72)=9.96$, $p<0.05$. It can be concluded, according to these findings, that students improved their study efforts in relation to their friends' study efforts in the cooperative group as a result of applying GI method twice.

Table 6
Students' willingness to be a group leader in cooperative group activities

Method / Willingness	Learning Together (LT)					Group Investigation (GI)				
	Application-1		Application-2			Application-1		Application-2		
	EG1	EG2	EG1	EG2	EG3	EG1	EG2	EG1	EG2	EG3
Yes	82.1	82.6	67.9	52	77.3	71.4	44.4	63	50	72
No	**17.9**	**17.4**	**32.1**	**48**	**22.7**	**28.6**	**55.6**	**37**	**50**	**28**

Note: Findings were given on the percentage. Application-1: First time application, Application-2: Second time application.

In the application-1 and the application-2 of LT method were equivalent to the students' opinions on willingness to be a group leader in cooperative group activities (Table 6). In addition, the chi-square test analysis was performed on the data obtained from the application-1 and the application-2 of LT method. There was no statistically significant difference between groups as a result of the chi-square test applied to data received by applying LT method once, $X2(1, n=51)=0.002$, $p>0.05$ and twice, $X2(2, n=75)=0.014$, $p>0.05$. In the application-1 and the application-2 of GI, the method weren't equivalent to the students' opinions on willingness to be a group leader in cooperative group activities (Table 6). The chi-square test analysis was performed to see if this difference is statistically significant. According to the results of the chi-square test which was applied to data obtained by applying GI method once, this study was found a statistically significant difference between groups in favour of the EG1, $X2(1, n=55)=4.11$, $p<0.05$. According to these results, it can be reported that students at the EG1 were more enthusiastic about being a group leader than those at the EG2. According to the results of the chi-square test which was applied to data obtained by applying GI method twice, this study was determined that there was no statistically significant difference among groups, $X2(2, n=72)=2.30$, $p<0.05$. The study results showed that students in cooperative groups were less willing to be a group leader as a result of the second application of GI method.

Table 7
Students' opinions on obtaining knowledge on their own without teacher support in their cooperative activities

Method / Opinions	Learning Together (LT)					Group Investigation (GI)				
	Application-1		Application-2			Application-1		Application-2		
	EG1	EG2	EG1	EG2	EG3	EG1	EG2	EG1	EG2	EG3
Very	71.4	60.9	78.6	60	68.2	71.4	63	63	75	36
Some	**28.6**	**34.8**	**21.4**	**40**	**27.3**	**25**	**22.2**	**37**	**25**	**64**
Very Little	0	4.3	0	0	0	3.6	14.8	0	0	0
No	**0**	**0**	**0**	**0**	**4.5**	**0**	**0**	**0**	**0**	**0**

Note: Findings were given on the percentage. Application-1: First time application, Application-2: Second time application.

In the application-1 of LT and GI methods, and the application-2 of LT method were equivalent to the students' opinions on obtaining knowledge on their own without teacher support in their cooperative activities (Table 7). In addition, the chi-square test analysis was performed on the data obtained from the application-1 of LT and GI method, and the application-2 of LT method. There was no statistically significant difference between groups according to the chi-square test applied to data received as a result of applying LT method once, $X2(2, n=51)=1.58$, $p>0.05$, and GI method once, $X2(2, n=55)=2.10$, $p>0.05$ and LT method twice, $X2(2, n=75)=2.27$, $p>0.05$. In the application-2 of GI method wasn't equivalent to the students' opinions on obtaining knowledge on their own without teacher support in their cooperative activities (Table 7). In addition, the chi-square test analysis was performed to see if this difference is statistically significant. According to the results of the chi-square test which was applied to data obtained by applying GI method twice, this study was determined that there was a statistically significant difference among groups, $X2(2, n=72)=7.531$, $p<0.05$. It can be

concluded, according to these findings, that students improved their ability to obtain more knowledge on their own without teachers' support as a result of applying GI method twice.

Table 8
Students' opinions on perceiving their levels at different fields in cooperative activities

Method / Opinions	Together Learning (LT)					Group Investigation (GI)				
	Application-1		Application-2			Application-1		Application-2		
	EG1	EG2	EG1	EG2	EG3	EG1	EG2	EG1	EG2	EG3
Problem solving	4.57	4.73	4.68	4.40	4.18	4.36	4.22	4.44	4.60	4.04
Preparing written documents	**4.39**	**4.82**	**4.61**	**4.64**	**4.27**	**4.50**	**4.44**	**4.56**	**4.65**	**3.84**
Giving a speech	4.25	4.52	4.46	4.48	3.91	4.29	4.19	4.71	4.85	4.20
Working in intra- and inter-groups	**4.32**	**4.73**	**4.61**	**4.48**	**4.22**	**4.07**	**4.15**	**4.63**	**4.65**	**4.28**
Organizing and planning	4.43	4.73	4.64	4.32	3.96	4.35	4.11	4.74	4.45	4.32
Making good use of the time	**4.46**	**4.73**	**4.61**	**4.28**	**3.86**	**4.29**	**4.22**	**4.56**	**4.65**	**4.16**

Note: Findings were given on the average above 5 points. Application-1: First time application, Application-2: Second time application.

In the application-1 of LT and GI methods were equivalent to the students' opinions on perceiving their levels at different fields in cooperative activities (Table 8). In addition, the chi-square test analysis was performed on the data obtained from the application-1 of the LT and GI methods. There was no statistically significant difference between groups as a result of the chi-square test applied to data received from the first application of LT method, Problem Solving: $X2(2, n=51)=1.18$, $p>0.05$; Preparing Written Documents: $X2(3, n=51)=5.61$, $p>0.05$; Giving a Speech: $X2(2, n=51)=4.339$, $p>0.05$; Working in Intra- and Inter-groups: $X2(4, n=51)=6.00$, $p>0.05$; Organizing and Planning: $X2(sd=3, n=51)=1.928$, $p>0.05$; Making Good Use of the Time: $X2(3, n=51)=3.57$, $p>0.05$, and GI method, Problem Solving: $X2(2, n=55)=0.588$, $p>0.05$; Preparing Written Documents: $X2(2, n=55)=0.166$, $p>0.05$; Giving a Speech: $X2(2, n=55)=5.01$, $p>0.05$; Working in Intra- and Inter-groups: $X2(4, n=55)=4.61$, $p>0.05$; Organizing and Planning: $X2(3, n=55)=1.54$, $p>0.05$; Making Good Use of the Time: $X2(4, n=55)=3.07$, $p>0.05$. In the application-2 of LT and GI methods, it was observed that the students' opinions at the EG1 and EG2 were more than at the EG3 on perceiving their levels at different fields in cooperative activities (Table 8). The chi-square test analysis was performed to see if this difference is statistically significant. According to the results of the chi-square test that was applied to data which was obtained by applying LT twice, this study determined that there was a statistically significant difference between groups in the characterization items of "Problem Solving" and "Giving a Speech", Problem Solving: $X2(6, n=75)=17.86$, $p<0.05$; Giving a Speech: $X2(4, n=75)=13.12$, $p<0.05$. According to the results of the chi-square test which was applied to data obtained by applying GI twice, there were no statistically significant difference between groups in the characterization items of "Working in Intra- and Inter-Groups" and "Organizing and Planning". However, in other characterization items, a statistically significant difference among groups was found, Problem Solving: $X2(4, n=72)=10.230$, $p<0.05$; Preparing Written Documents: $X2(6, n=72)=16.038$, $p<0.05$; Giving a Speech: $X2(4, n=72)=16.192$, $p<0.05$; Making Good Use of The Time: $X2(4, n=72)=9.713$, $p<0.05$. According to the study results, it can be concluded that applying LT and GI methods twice made positive contributions to problem solving and the ability to give a speech, and applying GI method twice also contributed positively to preparing written documents and making good use of the time.

Table 9
Students' preferences for performing a cooperative group activity again

Method / Preferences	Learning Together (LT)					Group Investigation (GI)				
	Application-1		Application-2			Application-1		Application-2		
	EG1	EG2	EG1	EG2	EG3	EG1	EG2	EG1	EG2	EG3
Studying in courses other than Science and Technology	57.1	82.6	60.7	52	50	53.7	74.1	70.4	55	44
Using time efficiently	**67.9**	**82.6**	**78.6**	**48**	**40.9**	**46.4**	**59.3**	**66.7**	**70**	**52**
Choosing a good division of labour with groupmates	60.7	91.3	75	44	45.5	67.9	70.4	59.3	45	44
Using more resources for the study	**67.9**	**87**	**78.6**	**36**	**36.4**	**57.1**	**74.1**	**66.7**	**65**	**56**

Note: Findings of each item were given on the percentage in itself (Students are marked more than one option). Application-1: First time application, Application-2: Second time application.

According to Table 9, the data obtained from applying LT and GI methods once showed that students at the EG2 were more willing to study in courses other than Science and Technology, use time efficiently, choose a good division of labour with groupmates and use more resources for the study than those at the EG1 in the event of performing a cooperative group activity again. According to the analysis of the data obtained by applying LT and GI methods twice, the study found that the view percentages of the students at the EG1 for performing a cooperative study again were more than those at the EG2 and EG3. Moreover, in terms of the development of students at the EG1 and EG2, most of those at the EG1 expressed more positive opinions while those at the EG2 were more negative compared to the first year. The data obtained in this part were not analysed because they were not appropriate for the chi-square analysis.

DISCUSSION

This study investigated the effects of the application of learning together (LT) and group investigation (GI) methods at different intervals on the features of cooperative learning model. This section includes discussions based on the study's findings.

This study determined that groups to which the LT and GI methods applications were applied twice to were better on the subject of broadening students' thought horizon than those to which the LT and GI methods applications were applied only once. Moreover, they were also better at understanding the course subject and increasing self-confidence in the GI method applications. The broadening of the students' thought horizon could result from the fact that students had group discussions regarding the issue and thus they had the opportunity to learn about the issue from different perspectives. Group work involving individuals at different levels supports critical thinking by creating an opportunity for members to observe different perspectives (Şimşek, 2014; Fung, To, & Kit, 2016). In this aspect, improvement of students' critical thinking powers by adding something to themselves can ensure their thought experience to broaden. In recent years, it has been seen that education methods have given way to applications of methods and activities that make students think critically in order to enable them to learn better (Cantürk-Günhan & Başer, 2009; Fung, To, & Kit, 2016; Yıldırım & Şensoy, 2011).

Students reported that they have become a person who can perform an action on their own because of the GI method application. The method enabled students to increase their self-confidence and teach them to feel valued. In just one year, the data obtained showed that most students were willing to become the group leader. Being the group leader means taking responsibility for the group members. The willingness to take responsibility in the class reflects that students had an interest in the course material and had an awareness that "that they can do too, they can learn too". In this method, group members talk about the subject with one another, and this allows each student to express themselves. An environment in which children can express themselves easily will also improve

their personality, because having the opportunity to express themselves is important in terms of enabling individuals to have self-confidence and feel valued (Senemoğlu, 2012; Slavin, 2014). Moreover, students reported that they made an effort to learn the lessons before and after the class. By making an effort to learn lessons, it shows that they are taking active participation in the class. In classes, students learn by using their minds and experiences to put their learning into practice (Aşiroğlu, 2014; Slavin, 2014). Thus, learning will be more significant and permanent because it will be because of students' own responsibility and their own effort and desire in the learning process (Ünal & Ada, 2000).

The results obtained regarding the willingness to be the leader of the groups determined a sharp decrease in students' opinions in the second year. In this method, group members take joint action in every respect and jointly meet the needs of the group, so the above-mentioned situation could emerge for this reason. There are some differences between the concept of group leadership in cooperative groups and in traditional leadership. In the application process, it is likely that the concept of collaborative leadership, in other words, "distributed leadership" have become prominent beyond traditional leadership. Distributed leadership is the sharing of relationship-based activities, actions, and power distribution (Gronn, 2000; Ogawa & Bossert, 1995). Therefore, it is possible that students did not want to become a leader because of the view that the process is managed all together. Furthermore, in the application performed using LT method on being a group leader, this study found no difference between experimental groups, while a difference was found in the application performed using GI method. In the second year, GI method applications were performed in the eighth grade. Students have Transition from Basic Education to Secondary Education examinations (TEOG) in eighth grade. It is possible that the students did not want to take on more responsibility because of the importance of these examinations. Therefore, this situation could result from the fact that the education system is exam-oriented system. Some studies have determined that students have test anxiety and always feel compelled to solve test problems in an exam-oriented system (Coşaner & Silman, 2012; Çakmak & Aslan, 2016; Zorlu & Zorlu, 2015). Therefore, it is possible that students preferred to focus on central examinations rather than performing the duties of group leadership.

Students reported that they could solve problems which they encounter using LT method applications. To solve problems, it is necessary to have different perspectives. Special attention should be given to the preferred learning methods that teach students to have different perspectives. Students working with LT method within a group can exchange their ideas with one another. Before discussing with the teacher, they can handle problems with their groupmates (Ding & Harskamp, 2006). Thus, they can learn from different perspectives. Furthermore, students reported that they want the application of LT method in different classes and different lessons. This method made students think that they were valued. Students reported that they can use time more efficiently, choose divisions of labour better, and use resources more productively with the application of this method in the course. Based on these results, it can be argued that students reported that they understood units better with the LT method applications.

Students who had participated in the first-year application of LT method reported that they learned how to perform an action on their own and how to be a leader, while the second-year participants learned how to work together and give a speech. Students can make up the deficiency during lessons by working together and supporting one another. Studies of Johnson, Johnson, and Holubec (1994), and Johnson and Johnson (1996) also determined that students support each other by working together in cooperative learning groups and thus, they jointly achieved better success than they could achieve individually. Moreover, it can be stated that the collaboration has improved the social skills and friendship of the students because group members would receive support from their groupmates (Farrel & Jacobs, 2016; Leung & Chung, 1997). Alacapınar (2008) conducted a study and indicated that the collaboration of students allows them to share knowledge, skills and emotion.

Students who had participated in the first and second applications of GI method jointly expressed more positive opinions on the subjects of working together; becoming a person who can perform an action on his/her own, improving self-confidence, broadening thought horizon, solving problems, using

time efficiently and giving a speech. However, students who had participated in the first application indicated that the method was useful, and they found it pleasurable the second time. Teachers reported that applying the method twice provided savings in terms of time, and it created an environment which enabled them to teach lessons more easily because students already knew the application of the method. Studies of Şimşek (2005, 2007) and Yıldırım (2006) determined that one of the negative opinions presented about the methods was that students did not have enough time. It has been thought that positive contributions can be made for students in terms of gaining time as a result of applying the methods in classrooms twice. This gives more time for teachers to teach lessons in class, and their efficiency of the will without a doubt, increase.

CONCLUSION

This study investigated the effects of the application of learning together (LT) and group investigation (GI) methods at different intervals on the features of cooperative learning model. This section includes the conclusions based on the study findings.

In this study, the data obtained from LTVS and GIVS showed that students found the LT and GI methods applications, which were performed twice, more pleasurable, informative and useful. Students who performed the applications twice knew the method and they enjoyed the process and better understood its advantages. With respect to working together, this study was also determined that the opinions of the experimental groups to which the cooperative methods had been applied twice were more improved than those in the other experimental groups to which the cooperative methods had been applied only once. According to the findings of the study, it can be said that the applying the LT and GI methods twice have increased students' information sharing. One of the most important features of the cooperative learning model is sharing (Gillies, 2004; Tamah, 2014; Zakaria & Iksan, 2007). Therefore, it can be stated that this model enables students to study with their groupmates because of an increased tendency toward sharing.

This study found that applying the LT and GI methods once and twice have contributed to the improvement of the features of the cooperative learning model. This study was conducted with the use of the new experimental design that was created based on a revision of a Solomon Experimental Design. It presented the effectiveness of the methods and their internal and external validity. Based on the findings derived from student opinions, the researcher suggests that future studies should be focused on the dramatic decrease in students' desire to become the group leader in the second year. Researchers should also ensure that students fully understand the description of a group leader at the beginning of the implementation and consider it during the implementation in accordance with the cooperative learning method. Furthermore, using different methods in the future with this new experimental design will show the effectiveness of the method more clearly. The researcher believes that learning methods will become more useful and students will learn their lessons with an awareness of the methods thanks to these benefits.

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