

# CHALLENGES OF APPLYING COLLABORATIVE LEARNING WITH A SAMPLE OF TURKISH STUDENTS

GULSEN BAGCI KILIC

**Abstract** – *In this study, collaborative learning was applied in an Elementary Science Laboratory course in an Education Faculty at a Turkish public university. The Elementary Science Laboratory course constituted the first phase of the study, with the researcher putting together the groups to be involved. The groups were required to collaborate in the laboratory while doing the experiments, and out of laboratory in writing their group report. A qualitative inquiry about the students' collaboration was conducted at the end of the course by giving an anonymous questionnaire. Although the students preferred collaborative learning, there were several cases where members did not contribute to the group task. The students' unwillingness in informing the instructor about group dynamics was also observed. Most of the students stated that they preferred forming their own groups. On the basis of the results of Phase I, the second phase of the study was designed and applied in Elementary Science Methods II course with the same student group. In the second phase of the study, the students were given the freedom of forming their own groups. In addition, self and peer assessment was used to provide information about group process. The results of Phase II showed that the students' collaboration increased, but the number of single-gender groups also increased. Self and peer assessment was found helpful in providing information about group dynamics which could not be obtained directly from the students in Phase I. The paper summarizes the application and results of both phases, and then discusses the challenges of applying collaborative learning with the sample of Turkish students participating in the study.*

## Introduction

**C**ollaborative learning may be defined as the collaborative efforts of students to learn together. Collaborative learning is also defined as a philosophy of interaction and personal lifestyle (Panitz, 1996). It differs from cooperative learning, since cooperative learning requires structured, systematic techniques for ensuring positive interdependence within groups and recommends individual accountability rather than undifferentiated group grading (Johnson & Johnson, 1999).

There is a tremendous body of research on cooperative learning. A few literature review studies were published to organize and analyze the research

results in this area (Johnson, Maruyama, Johnson, Nelson & Skon, 1981; Nastasi & Clements, 1991; Slavin, 1983; Slavin 1991). In a meta-analysis of research on the effect of cooperative, competitive, and individualistic goal structures on achievement, cooperative learning increased students' achievement more than competitive and individualistic learning (Johnson *et al.*, 1981). Slavin (1983) reviewed the research on cooperative learning and concluded that cooperative groups significantly outperformed the controlled groups in most of the studies. Slavin's (1991) second research review also investigated that most experimental research studies favored cooperative learning.

Most of the research studies on cooperative learning have been carried out at elementary and secondary levels of education (Slavin, 1991). Fewer studies have been conducted at college and university level. Cooper (1990) reported a growing interest in cooperative learning among higher education practitioners. Reynolds & Salend (1989) provided guidelines to use cooperative learning in a special education teacher education program, and reported students' satisfaction in one exemplary course.

The effectiveness of cooperative learning in the multicultural classroom has also been investigated. Research results indicate that academic achievement of African American students increased in cooperative learning classrooms (Cohen, 1986; Slavin & Oickle, 1981; Slavin, 1990). It has also been found in a number of studies that cooperative learning experiences result in higher academic achievement for minority students (Johnson & Johnson, 1983a; Johnson, Johnson & Maruyama, 1983b; Haynes & Gebreyesus, 1992; Reid, 1992). George (1994) compared different cooperative learning methods (drill and review dyads, cooperative response techniques, and group grading incentives) with traditional learning methods using a non-cooperative group in multicultural university classrooms. The cooperative group showed significantly stronger performance than the non-cooperative group.

Collaborative learning is not as structured as cooperative learning. Discrete labor division is not required. Group members organize their group-work, determine and share responsibilities on their own. There has not been as much research on collaborative learning as there has been on cooperative learning. At university level, it is sometimes difficult to determine the group members' responsibilities from the beginning. In addition, students at university level should learn to regulate their learning even in group learning. Thus, collaborative learning was preferred in this study. Collaborative learning is a strategy promoted in western countries, individual learning is more common in the university where the study was carried out. Since the cultural setting is different, every new strategy should be tested and adopted to the culture of the student body enrolled.

The purpose of this study was to investigate a method, which supports students' collaboration. For this purpose, different strategies were applied in two different courses with the same students. First course was Elementary Science Laboratory course. The students collaborated in laboratory while doing the experiments and in out of laboratory in writing group reports. The groups were formed by the instructor, and the students' collaboration in and out of class was analyzed. The students' preference in group formation was also searched. This course constituted the first phase of the study. The second phase of the study was designed on the basis of students' feedback on the first phase, and applied in Elementary Science Teaching Methods II course. The students formed the groups and self and peer assessment was used to gather information about group dynamics. The students' collaboration was again investigated. The paper reports the application and findings of the two phases. Some cultural factors emerging from the data which affected the students' collaboration are also discussed.

Both phases of the study were conducted at a university, which is located in a small city in the northwest of Turkey. All of the students were from different cities of the country. No international students were involved.

## **Phase 1**

The first phase of the study was conducted in seven sections of the Elementary Science Laboratory course given by the researcher. The course was a one-semester program and compulsory for the second-year students in the Elementary Education department. The researcher applied collaborative learning strategies in the course. The formation of groups by the instructor is a recommended strategy used in cooperative learning (Fiechtner & Davis, 1992; Smith, 1986) since it prevents the group from over socializing and reducing the effort put on the group's task (Cooper, 1990). In addition, the researcher did not know the students well enough to form the groups by their background or abilities. Thus, the researcher formed the groups according to the student list.

### *Participants*

In total there were 194 students in seven sections of the course. 55 groups were formed. Two groups had six members, 14 groups had five members, 28 groups had four members, 9 groups had three members, and 2 groups had two members. When the groups were classified according to gender, 38 groups (69.1%) were mixed-gender groups, fifteen groups (27.3%) were all-girls groups and only two groups (3.6%) were all-boys groups.

## *Application*

Each laboratory session involved 3 hours a week. Groups were doing science experiments, which they might use in their future teaching, and discussing as a group how they would use the experiments in teaching the subject under study to elementary students. At the end of each laboratory session, the researcher interviewed each group to understand what they had learned and how they had decided to teach that subject by using the experiments. Based on the interview results, the researcher assigned a group score to each group. The students were required to write a laboratory report as a group on the experiments and their group consensus on how to teach the subject. They submitted their group reports in the following week. The researcher graded laboratory reports and a group score was assigned to each group.

## *Problem*

Based on her informal observations during the laboratory sessions and lack of improvement in the students' group reports, the researcher decided that the students' collaboration was not very effective, because group reports were not developing although the researcher had written many comments on the reports and gave them back to the groups. The researcher communicated with some of the groups to obtain information about the groups' dynamics, but they were not comfortable in talking about the problems in their group. The researcher told them they might write the problems individually in their groups and bring it to her office at their convenience. The students did not write any comments or criticism about their group. Finally, the researcher decided to analyze the problems in group-work. At the end of the semester, the researcher requested the students to fill out an open-ended questionnaire about collaboration in their group.

## *Method*

Since, it would have been difficult to analyze 194 questionnaires qualitatively, the researcher randomly selected a group member from each group to fill out the questionnaire. The questionnaire was filled out anonymously to get candid responses to the questions. The students filled out the questionnaire at their convenience and returned it to the researcher's office. Although 55 groups were given the questionnaire, 45 questionnaires were returned and included in the analyses.

The questionnaire consisted of four open-ended questions. The questions were:

1. Do you prefer studying individually or in a group? Why?
2. Did every group member participate in group-work? If not, what were the reasons?
3. Did every group member participate in writing laboratory reports? If not, what were the reasons?
4. Do you prefer choosing group members by yourself? Why?

The aim of the first question was to investigate the preference of the students either to work individually, or in a group. The second question was asked to figure out if group members collaborated in the laboratory sessions. The third question was asked to understand if group members collaborated out of class to write the laboratory reports for the following week. The common aim of the second and third questions was to analyze the group collaboration in and out of the class. The fourth question aims to investigate the students' preferences in group formation.

In addition to the questionnaire, the researcher's informal observations were another data source in the study. Since the researcher was the instructor and laboratory assistant at the same time, more formal observations could not be made.

### *Analyses*

Descriptive analysis method was applied in the analysis of the students' responses to the questions. Each question was analyzed separately. The students' responses were first coded and then categorized. The codes and categories were derived from the data inductively. The frequency of each code was calculated and formed the framework for the discussion of the data. Some cultural factors emerged from the analyses and will be presented in related sections.

## **Results and discussion**

### *Preference of the students*

Forty-four students responded to the first question, which asked if they preferred studying in a group or individually. Thirty-two students (71.1%) preferred working in a group, whereas twelve students (26.7%) preferred studying alone. The students participating in this study were not reflective at all in their responses about the reasons behind their choice, since this was the first research

study in which they had participated. Although they were informed that this is done for research purposes, most of them did not elaborate the reasons in depth in their responses.

The students who preferred studying in groups valued group-work and stated its benefits. They stated that working in a group requires exchange of ideas (eight students), compensates each other's weaknesses (five students), supports peer-teaching (two students), provides a context for sharing (two students), and forms a discussion forum (two students). They also reported that group-work requires collaboration (two students), activates people (one student), and is fun (one student). One student acknowledged the social aspect of group-work by stating that group-work socialized the members in the group. Another student stated that working in a group promotes learning more than lectures. These are the general benefits of collaborative learning as valued by the students.

The twelve students (26.7%) who preferred studying individually reported the irresponsible character of some members (two students), insensibility toward the group task (one student) as reasons for them to dislike the group-work. One student reported that members worked individually in the group. Another student did not like group-work since the students worked less in the group. Two students clearly stated that they work better individually.

Results indicate that the students were aware of the benefits gained by collaborative learning and most of them preferred group-work. The students who did not prefer group-work provided their inadequate experience in the group in which they studied as a reason for disliking group-work. Only two students stated that individual learning is their style and they learn better when they study alone.

### *Collaboration in the classroom*

The intention of the second question in the questionnaire was to investigate if the students collaborated in the laboratory. Forty-three students responded to the question. Thirty-two students (71.1%) stated that each group member participated in the group-work while doing experiments and the discussion after the experiments.

Eleven students (24.4%) reported that every group member did not participate in the group-work. The students proposed some group members' low interest in the course (six students), silent (one student), conservative (not comfortable in working with the people in opposite gender) (one student), and irresponsible (one student) character of students as reasons for not participating in the group-work. Most of the reasons for not collaborating in the groups were related to student characteristics. There was no response relating to the structure of the group-work or difficulty of the group task.

Results indicate that most of the groups collaborated while they were doing the experiments in the laboratory. The groups who reported some members' lack of participation stated that they did not collaborate because of the members' lack of interest in the course or because of their silent, irresponsible, and conservative personalities.

### *Collaboration out of the classroom*

Third question in the questionnaire provided the data on the students' collaboration out of the laboratory. Reports were written out of the laboratory and groups handed in their group report in the following laboratory session. Thus, the students had to come together and work on their group report out of the class.

Forty-two students responded to this question. Twenty-nine students (64.4%) reported the participation of every group member in writing the reports. Although it was not intended in this question, ten students explained how they shared the group-work. They stated that one member wrote the group report one week, another member the following week and so on, instead of coming together and writing the report together or dividing the task into parts and come together to combine the parts and develop the group report. The researcher's observation during the semester supported this result. Group reports were not developing throughout the semester although the researcher had written many comments on the reports. This individual report writing negatively affected the development of the quality of reports, because the feedback of the researcher on the reports was not taken into consideration since another member wrote the report the following week.

Thirteen students (28.9%) clearly stated that every group member did not participate in writing group reports. The reasons for not participating in report writing were: living in different places (two students), the difficulty of report writing (one student), and low quality of hand-writing (one student). Because of the lack of computers in the university, students wrote their report in handwriting. There were two students who indicated the disadvantages of assigning the same score to group members in the assessment of group performance. They stated that the students who wanted to get high grades dominated the group, took most of the responsibility to guarantee the success, and wrote the reports.

'Since we got the same grade for each member, some students who wanted to get high grades wrote the reports.'

'One of our friends could not prepare a good report, so we did not force him. We wrote the reports.'

The main intention of this question was to analyze if the students collaborated out of the classroom. Twenty-nine students (64.4%) reported every member's participation in writing the group report. Ten of these students detailed members' participation in report writing by stating that they rotated in taking the responsibility of report writing; one member wrote the report individually every week. Thirteen students (28.9%) clearly stated that every group member did not participate in writing reports. If these two results were added up, twenty-three groups (54.8%) did not collaborate out of the classroom. The number of the groups, which did not collaborate in the class, was eleven (24.4%) (see previous section). The number of groups that did not collaborate was doubled if the group task was done out of the classroom.

One factor, which might be cultural, aroused from the students' responses to this question and deserves attention. Power of friendship in Turkish culture affected the students' collaboration. One example student response is the following:

'One of the group members did not participate in report writing and got the same grade as us, it is not a problem, because s/he is our friend.'

This student confuses friendship with working together and taking responsibility. Friendship made some students care for each other in group-work. The power of friendship also resulted in overprotection of friends. Most of the students in this study did not report irresponsible group members to the instructor. They did not give any information about the group dynamics to the instructor. One student's response is a good example:

'I wrote four reports, but other members were preparing the content. On the other hand, there was one member who did not collaborate in the lab and write any report. S/he got the same score as us.'

This group did not report this member on time. They report it on the questionnaire at the end of the semester. They should have been disturbed by a person who did not do anything in their group, and should have informed the instructor in order to find a solution, but again the power of friendship in Turkish culture might have prevented this group to bring the problem to the instructor. The instructors in Turkey should observe the groups very carefully if the group-work is done in the classroom. If it is done outside of the classroom, they should find ways to gather information about group dynamics. The researcher did this by giving an anonymous questionnaire in this semester. The following semester, the instructor applied self and peer-assessment and found that self and peer-assessment also provided information about group dynamics.



### *The students' preference in group formation*

The fourth question in the questionnaire asked if the students preferred choosing their group members by themselves, and what the reasons for their choice were. Forty-four students responded to the question. Thirty-four students (77.3%) preferred choosing group members themselves, six students (13.64%) stated that instructor should form the groups. Four students (9.01%) could not decide which option would be better. The students elaborated the reasons behind their choice in this question more than they did in other questions in the questionnaire. The reasons for each choice are presented in the following sections.

#### *Reasons for choosing the group members by themselves*

Thirty-four students (77.3%) preferred forming their group themselves. These students stated that they wanted to choose their group members themselves, because they would work more productively (15 students), coherently (seven students), and responsively (two students). They also reported that they would interact (three students) and collaborate (one student) more, and come together to study easily (three students) if they choose their group members.

Based on students' responses, it was concluded that most of the students in the study recognized close friendship as a critical factor for productive and responsible group-work, effective collaboration and coherence in the group. They believe that they interact more and come together to study easily if they form their own group.

#### *Reasons for choosing the group members by the instructor*

Six students stated that they prefer the instructor form the groups as in this semester. Only four students elaborated the reasons for their choice. One student stated that s/he was already able to work with close friends by chance. Another student stated that s/he should be able to work with different people.

'It is better if the instructor choose group members, because we should be able to work with different people.'

Another student raised the point that if the students choose the group members themselves, there would be subgroups within the groups.

'If everyone chooses close friends as group members, there would be subgroups within the groups.'

The last student clearly stated that s/he did not prefer choosing the group members, because s/he would not work at all and expect his/her friends to do the work.

‘If I worked with my close friends, I would totally rely on my friends and I would not have worked at all.’

### *Reasons for undecided responses*

Four students stated that they could not decide which option would be better. Two of these students stated that it does not matter who forms the groups. The other two students elaborated the reasons behind their choices. One of them was related to the importance of worldview. This student emphasized that the worldview of students whom s/he would be working with is important for her/him. If the instructor forms the groups, s/he stated that s/he couldn’t interact with group members if their worldview is very different from her/his own.

‘I could not decide, because if I choose the group members and one of them did not work, problems might arise. If I did not choose the group members, there would be no problems but since I did not know that person well, I could not interact with her/him. Furthermore, if her/his worldview is very different from mine, I would be against her/him.’

Another student stated that s/he would have preferred choosing group members herself/himself if it had been asked at the beginning of the course, but that s/he changed her/his mind and was glad to work with other students. S/he stated that they will be teachers and should get used to working with different people.

‘If this question had been asked at the beginning of the course, I would have answered ‘yes’, because I like working with my friends and I would express myself better to my friends. But I am glad I did not work with my close friends. We will be teachers; we should get used to working with everyone.’

## **Evaluation of Phase I**

Most of the students in the study preferred collaborative learning to individual learning. They collaborated more in the classroom tasks than out of classroom tasks. They also preferred forming their groups themselves rather than the instructor forming them.

The power of friendship feelings affected the application of collaborative learning in this course. The students did not inform the instructor about group dynamics and protected irresponsible friends. They proposed that they would study more productively, responsively, and collaborate more if they chose group members by themselves. According to them, forming groups with close friends is a critical factor in establishing coherence in groups.

Based on the results in Phase I, the researcher decided to initiate the second phase of the study. In this phase, the students were allowed to choose their group members. Since most of the students clearly stated that they wanted to form their group themselves in Phase I, the researcher decided to try this strategy of group formation in Phase II.

Two students reported the disadvantage of having a group grade, as some members dominated the group to guarantee the success of the group, especially in the out-of-classroom task (i.e. report writing). In addition, it was difficult to gather information about group dynamics in Phase I. Giving an anonymous questionnaire provided some data, but the anonymity makes it impossible to use this information to give feedback to the groups. In Phase II, self and peer-assessment were applied to assess each member's contribution to group-work, and to gather information about group dynamics.

## **Phase 2**

The second phase of the study consisted of another course in the following year. Three sections of the students participating in Phase I registered in the Elementary Science Teaching Methods II course.

### *Participants*

In all, 139 students participated in Phase II. Thirty-six groups were formed in three sections. The group size was generally three to five students; two groups consisted of two students, nine groups consisted of three students, 18 groups consisted of four students, six groups consisted of five students, and only one group consisted of six students.

### *Application*

Elementary education students are required to take two Elementary Science Teaching Methods courses in the third year of the teacher education program. In Elementary Science Teaching Methods I course, students learn methods of science

teaching, learning theories, and assessment and evaluation. The Elementary Science Teaching Methods II course is designed to offer students experience in elementary science teaching. Since the number of elementary schools in the city was scarce, it was not possible to provide natural classroom experience for pre-service teachers during the course. Microteaching was the only alternative to provide a context in which students would experience science teaching. Since 139 students registered to three sections, the class sizes were large; approximately 45 students in each section. The researcher required students to teach science through hands-on science activities. The expense of the materials for science activities, and application of activities in a crowded classroom is difficult for a student to sustain. Thus, the researcher thought that it would be the task of the group to do activity based science teaching in such crowded classrooms.

The students were allowed to form the groups by themselves in this phase. These groups will be called teacher-groups from now on. Teacher-groups were formal groups, which lasted till the end of the semester. Teacher-groups planned an activity-based science lesson and applied it in the classroom.

During the classroom application, five or six informal student-groups were formed. The student-groups were temporary and studied as a group in the activities during a class session. One member of the teacher-group started the lesson, motivated the students toward the science subject under study, and introduced the science activity. Then, other members of the teacher-group distributed the materials to the student-groups and interacted with two or three student-groups during the activity. At the end, the same member of teacher-group took control, got the results from the groups, and summarized the findings. Teacher-groups conducted three such science teaching as a group throughout the semester.

The instructor observed the teacher-groups' product during the classroom application and assigned a group score to each teacher-group. But most of the group process was out of the classroom. In order to assess the teacher-groups' process and to increase responsibility of group members to contribute the group-work, the researcher used self and peer-assessment. The researcher developed a group assessment form. The students assessed themselves on the first section of the form. It was asked to write his/her responsibility in the group-work, explain what s/he did to sustain the responsibility in an open-ended form, and devote a score out of 100 for his/her contribution to the group-work. The students assessed their peer in the following sections of the form by repeating the same procedure for each member. The student first wrote the member's responsibility, then what s/he did and devoted a score out of 100 to the member. In this way, each member of the group assessed the self and each other on the assessment form.

Each member of teacher-groups was given the form at the end of each group-work and assessed group members' contribution (including the self) to the group-work. The students' self and peer-assessment scores contributed 5% to their score for each group project. Thus, each member received a different score from the same group-work depending on the scores received from the group assessment form.

## **Results and discussion**

### *More collaboration, less problems*

The researcher observed the groups' product, but she noticed that most of the groups provided good science lessons, which indicated group processes were better than in Phase I. In addition, the students were allowed to change their groups if they experienced any problem. Most of the groups formed in the beginning of the course continued with the same members, only a few students changed their groups in the following group studies.

Group assessment forms also supported this result. One question asked if there was any problem in the group process. On the analysis of this question, the researcher rarely noticed problems reported by group members.

### *Single-gender groups formed*

The students chose their group members themselves in this phase. Of the 36 groups formed, 29 groups (80.6%) were single-gender groups. Sixteen groups (44.4%) were all-girls groups and 13 groups (36.1%) were all-boys groups. Only seven (19.4%) groups were mixed-gender groups.

There were 55 groups in the first phase. 17 groups (30.9%) were single-gender groups whereas thirty-eight groups (69.1%) were mixed-gender groups. Fifteen groups (27.3%) were all-girls groups and only two groups (3.6%) were all-boys groups.

The percentage of single-gender groups increased from 30.9% to 80.16% in Phase II where the students formed the groups themselves. The increase in the formation of single-gender groups indicates that students prefer studying with their gender-mates. They would have felt more comfortable in studying with their gender-mates.

The students were allowed to change their group if they experienced any problem. Although seven mixed-gender groups were formed at the beginning of the course, six of these groups separated and members joined other groups

according to their gender: girls joined all-girl groups and boys joined to all-boys groups. Only one mixed-gender group remained in the end of the course.

The formation of single-gender groups when the students were given the freedom of forming their group is another challenge in applying collaborative learning in the study. There was no consensus in literature on the effects of gender in small group learning. Wilkinson & Fung (2002) provided a review of effect of gender on small group learning. Some research studies they reviewed (Webb, 1984; Lee, 1993) found out that the best option for girls (middle and high school level) was to work in balanced-gender groups, because girls were found to be at a disadvantage in both majority girls and majority boys groups. Wilkinson & Fung (2002) suggested that single-gender groups may also be a solution to problems in imbalance of interaction between boys and girls. Working in single gender groups might have increased the students' collaboration in groups in the second phase of this study.

Furthermore, Wilkinson & Fung (2002) concluded that ethnic background moderates the effect of gender on interaction and learning in small groups depending on the two research studies (Webb & Kenderski, 1985; Grant, 1986). Webb & Kenderski (1985) analyzed the effect of gender on small groups of African-American and Latino students, and found no significant differences in interaction between girls and boys and in learning, regardless of the composition of groups. Grant (1986) reported that African-American students at all grade levels were more egalitarian in their interactions whereas boys dominate interactions with girls among white students. The study presented in this paper was not originally aimed at analyzing the gender effect in groups, it was a result of the giving the students the freedom of forming their group. However, the effect of gender on interaction and group learning should be analyzed in detail in Turkey and other countries.

#### *Power of self and peer-assessment in providing information about group dynamics*

In Phase II, the students were required to assess each group member's contribution including their own. There are methods of calculating group members' contribution from self and peer-assessment scores (for a review of methods, see Lejk & Wyvill, 1996). The quantitative analysis of students' self and peer assessment scores was out of the scope of this paper, but the students' self and peer scores also provided information about groups' dynamics and is discussed in this section. The researcher analyzed self and peer scores qualitatively and combined them with her observations to provide information about group dynamics.

As an example, the process will be discussed on the self and peer scores of a four-member group. After each student's score was entered into a spreadsheet program, a matrix as in Table 1 was formed.

*Table 1. Self and peer-assessment scores of a four-member group*

	TD	MC	OG	UO	Mean
TD	85	90	85	85	86
MC	75	85	85	80	81
OG	75	80	80	80	79
UO	80	80	90	75	81

In this group, student TD devoted the highest score to himself (85), and next high score to UO (80), lowest but equal scores to MC and OG (75). If the scores are ordered from highest to lowest, the following order was established.  $s(TD)$  stands for score of student TD,  $s(UO)$  stands for score of UO, and so on.

TD:  $s(TD) > s(UO) > s(MC) = s(OG)$

MC:  $s(TD) > s(MC) > s(OG) = s(UO)$

OG:  $s(UO) > s(TD) = s(MC) > s(OG)$

UO:  $s(TD) > s(MC) = s(OG) > s(UO)$

According to the order of scores, TD devoted the highest score to himself, and also got highest scores from two members. Thus, the researcher decided that he did most of the work in the group. MC placed himself second, and is placed second by two other members. Thus, he was most probably the second hard-working student in the group. The situations of OG and UO are not very clear. The student OG devoted his highest score to UO, which is unreliable since three members, including UO, gave the highest scores to TD. OG devoted the lowest score to himself. UO devoted the highest score to TD and supported the idea that TD was the most hard-working student in the group. UO devoted lowest score to himself. After this analysis, the researcher decided that TD did most of the work in the group, MC was the second hard-working student in the group, and OG and UO were equal and worked the least in the group. Based on the researcher's observation, UO and OG are close friends and complimented each other in their peer-assessment. The researcher devoted different scores to each group member depending on the matrix analysis results.

The method of analyzing each score may seem confusing to an outside reader, but it is easier for an instructor who has rich observations about students in the class. The method was time consuming, but this method was the only method the researcher found useful to gather information from Turkish students about who worked and who did not work in the groups. The researcher sustained the role of judge in the assessment of group-work, depending on information given by the students and her observations. A student, in his response to self and peer-assessment, also suggested this.

‘Peer-assessment is good, because the things we could not tell you (the instructor) face to face could be written on the form. On the other hand, peer-assessment is not good, because some students did not assess each other objectively. The problem would be overcome if the instructor forms a balance between the two.’

## **Conclusion**

In conclusion, most of the Turkish students participated in this study preferred group-work. But, if the groups were formed by the instructor, they collaborated in the classroom tasks, but they could not collaborate in the out of classroom tasks. The formation of groups by the instructor is a recommended strategy (Fiechtner & Davis, 1992; Smith, 1986), since it prevents the group from over socializing and reducing the effort put on the group’s task (Cooper, 1990). However, this strategy did not work in the sample of Turkish students in the study. The students could not collaborate effectively, especially in out of classroom tasks with the members chosen by the instructor. At the end of Phase I, most of the students certainly stated that they wanted to form the groups themselves. They stated that they would form coherent groups with their close friends, work more productively, responsively, and collaborate more if they choose group members by themselves.

In Phase II, the students formed their group themselves, and their collaboration in these groups was better than in Phase I. Based on the results of this study, the instructor recommends that Turkish students should be allowed to choose their group members by themselves. One disadvantage of this would most probably be the formation of single-gender groups, which happened in this study. The percentage of single-gender groups in Phase II was more than twice the percentage of single-gender groups in Phase I. The same tendency was found among ethnic minority elementary students in Australia (Allard & Cooper, 2001). This would be controlled by stating a rule of forming mixed-gender groups for a group to be accepted by the instructor. In this way, they would have the chance to choose the person from the opposite gender with whom they would potentially collaborate.



Results also proved that students' cultural backgrounds affect their collaboration in the groups (Allard & Cooper, 2001). The power of friendship ties prevented students from informing the instructor about the problems in the groups and reporting the irresponsible members to the instructor. This might have been cultural or because the conditions in the university support the formation of strong friendships among students. Students are assigned to a section in the first year and take all the courses in the program together. That means that they generally work with the same students in the same section for four years. Most of them stay in dormitories at the campus or share housing in the city with their close friends. They spend most of their time with the people in their section.

The students' self and peer-assessment scores in this study provided the researcher with data to gather information about group dynamics by the analysis of students' self and assessment scores in the light of researcher's observations on the students. This was the best method of obtaining information from Turkish students about group dynamics that the researcher has found up to now.

The purpose of this study was to investigate the strategies that support students' collaboration in group work. When the results of both phases of the study were considered, the best option for the students in this study was the formation of groups by themselves and the use of self and peer assessment in the assessment of group process.

Awareness and acknowledgement of the students' cultural background may increase collaboration and thus the achievement of students. For this reason, similar studies should be conducted in other countries where there are minority students.

### *Limitations of the study*

Although this was a long-term study, there were some limitations. One major limitation was the collection of partial data from the students. This was caused by students' inexperience of participating in educational research study. They did not elaborate and reflect their ideas to the extent that was expected by the researcher. Although the researcher gave her guarantee that the questionnaire was given for research purposes and would not affect their grades, the students might have withheld their complete trust, for that reason were careful in their responses.

Another limitation of the study was that research was conducted in only one university in Turkey. Over-generalization to Turkish culture was not intended by the author and the reader should take this into account.

**Gulsen Bagci Kilic** teaches at the School of Education, Department of Elementary Science Education, Abant Izzet Baysal University, Bolu, Turkey. E-mail: kilic\_g@ibu.edu.tr or gulsenbagcikilic@yahoo.com

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