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Supporting Cooperative Learning with Technological Tools

Asst. Prof. Dr. Ayşe Derya IŞIK
Bartin University
Bartin, Turkey

Assoc. Prof. Dr. Gizem SAYGILI
Suleyman Demirel University,
Isparta, Turkey

Abstract. Criterias of Cooperative learning include positive interdependence, face-to-face promotive interaction, individual performance, social skills and group processing. Many techniques can be used with cooperative learning method such as learning together & alone, teams-games-tournaments, group investigation, constructive controversy, jigsaw, student teams achievement divisions, team accelerated instruction, cooperative learning structures, cooperative integrated reading & composition. The aim of this study is to evaluate the support of cooperative learning with technological tools. For this purpose, supporting of the elements and techniques of cooperative learning with the technological tools is discussed and various proposals are put forward in line with previous research results.

Keywords: Cooperative Learning; Elements and Techniques; Technological Tools

Introduction

The use of technology in educational environments has increased considerably, especially today in Turkey due to Fatih project conducted by the Ministry of Education. It is estimated that technology will be used more frequently in educational environment in the future (Bulun et al, 2004). Therefore, during the period in which educational politics are decided, there are considerable efforts to create opportunities and provide environment for students to develop their knowledge and skills related to the usage of technological devices.

As it is known, the technological tools are used in education and training environments for reasons such as to enrich the materials used with multimedia elements, to easily carry the materials created to the classes, to share with their students, to make corrections, to make materials comply with the situation and the requirements, to provide more effective learning for students by establishing

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material-student interaction, to facilitate classroom management, to increase interest and curiosity of the students to the subject of the lesson and to improve their attitudes towards the course (Isik & Cukurbasi, 2012). These uses support the teachers in the implementation of constructivist approach. Constructivist approach is an educational philosophy, which specifically focuses on the mind of the student, is based on the development of mental skills and argues that "the person's knowledge is occurred by his/her interaction with the environment'' (Bagci Kilic, 2001).

According to the constructivist approach, students' learning depends on their previous information, cognitive ability and environment. Learning is dependent on the environment because according to the constructivist approach learning consists of our experience in the real world (Duffy & Jonassen, 1992). Learning depends on the person's cognitive abilities because learning occurs by active efforts of individuals and information is structured in mind (Gunes, 2013). These items should not be ignored in the regulation of the educational environment. One of the most effective ways to use these items in educational environment is determining an effective teaching method. One of these methods is cooperative learning.

Slavin (2010) defines cooperative learning as arrangement in educational environments made by teachers to provide students to learn academic content by helping each other in small groups. Cooperative learning method provides an environment in which students apply their knowledge and skills to support and enrich each other's learning (Fisher & Frey, 2013).
The aim of this study is to discuss the support of cooperative learning with technological tools. For this purpose, supporting of the elements and techniques of cooperative learning with the technological tools is discussed and various proposals are put forward in line with previous research results.

Elements of Cooperative Learning and the Use of Technological Tools

There are five basic elements separating the cooperative learning from group work and the works done by the student teams can be defined as collaborative learning only if these criterias are met. In this section, it explains that what are these elements (Johnson & Johnson, 1989, Johnson, Johnson & Holubec, 1994, Johnson, Johnson & Smith, 1998, Felder & Brent, 2007, Johnson & Johnson, 2009) and what can be done to meet these criterias in technology-supported environments.

1. Positive Interdependence: The basis of cooperative learning is constituted by the success of the student inspired by the group members' success. Students should learn together, should develop products together, each student must have their own tasks in the group; product of group should be subject to fulfillment of the duty of each member. Positive interdependence should be established between students for the formation of this condition. It can be provided by an award, resources, roles and tasks commitment. Award interdependence can be provided by giving extra points to the group in which each member succeeds over 90%. Ensuring award interdependence is easier due

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to the fact that the test results can be evaluated quickly if individual or group works are done using the technological devices. Resources interdependence can be provided by giving a part of the tasks to be completed to the each member in the group. In the cases that collaboration is provided by technological tools, documents that ensure the fulfillment of the task (such as word files, presentations, programs) can be delivered to members of the group separately. Thus, group members can work combining the available documents. Roles interdependence can be provided by giving tasks such as readers, controllers, printer to members of the group. To provide roles interdependence in environments that is supported with technological tools, each student is given or asked to prepare documents related to their task. Tasks interdependence can be provided by giving tasks to each member of the group to complete their own task after they succeed the task of the previous group member. In collaborative environments that technological tools are used, tasks interdependence can be provided by differentiating each member's task into researching, making presentation, creating the final report and so on.

2. Face-to-face Promotive İnteraction: Students working together in groups in order to improve themselves encourage, support, help each other and provide feedback about the performance of the group friends with verbal and nonverbal responses. Cognitive processes such as explaining how to solve problems, teaching what they know to the group friends, establishing connection with the past learning and interpersonal processes such as changing someone else's thoughts, results, models and facilitating the learning process are used in the group. Students know the characteristics of each better. Elements used with technological tools such as video conferencing, e-mail, blogs, and social media will enable students to communicate synchronous and asynchronous and so, communication will be liberate aspect of time and place, and students will be able to communicate anywhere and at any time of the day they want.

3. Individual and Group Accountability: Identifying and evaluating the performances of the individual and the group is another element forming the basis of collaboritive learning. Students' contributions to the group product can be determined by giving individual test as well as observing what they do in the group. This can be done more easily in environments that technological tools are used. Giving individual tests and assessing process can be easier than performing them on paper. Performance of the members within the group can be determined by recording during the fulfillment of the group tasks. The recording of individual tasks of students within the group and determining the contribution to group product are easier in this way. Additionally, the purpose of cooperative learning is making each individual in the group progress by allowing them to teach each other. Development of students' individual performance can also be observed easier by recording the group process.

4. Social Skills: Another important element of cooperative learning is acquisition and the use of social skills by students. Students should be made aware of about social skills such as leadership, decision making, building trust, communication and conflict management and provided to use these skills.

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Guiding students who have problems, determining the elements required for the solutions are facilitated especially by the recordings of the communications between the students provided by technological tools.

5. Group Processing: Students are to contribute to the development of both themselves and the group friends by making their intra-group transactions in collaborative work environments. In this regard, it is important that the work is performed by the students and the level of fulfillment of the students and the contribution to the group product are determined by teachers. In this step, students should observe the behavior of each other within the group, establish effective ones and ensure that they continue, identify those that are ineffective and disrupt the group process and decide what to do to correct them. In collaborative learning environments that technological tools are used, it is easier to examine and identicate what behaviours are effective or not due to the fact that the students' group process is recorded.

Cooperative Learning Techniques and Use of Technological Tools

Cooperative learning methods and techniques can be used for facilitating the learning process of the students in classes, making them direct their own learning, providing support to each other in the group, improving student's achievements and attitudes, developing their study skills in a cooperative way, ensuring a constructive classroom and providing them social skills.

Table 1. Modern Methods of Cooperative Learning (Johnson, Johnson & Stanne, 2000)

Researcher-Developer	Date	Method
Johnson & Johnson	Mid 1960s	Learning Together & Alone
DeVries & Edwards	Early 1970s	Teams-Games-Tournaments (TGT)
Sharan & Sharan	Mid 1970s	Group Investigation
Johnson & Johnson	Mid 1970s	Constructive Controversy
Aronson & Associates	Late 1970s	Jigsaw Procedure
Slavin & Associates	Late 1970s	Student Teams Achievement Divisions (STAD)
Slavin & Associates	Early 1980s	Team Accelerated Instruction (TAI)
Kagan	Mid 1980s	Cooperative Learning Structures
Stevens, Slavin, & Associates	Late 1980s	Cooperative Integrated Reading & Composition (CIRC)

The characteristics of the techniques used for cooperative learning are (Johnson & Johnson, 1988, Slavin, 2010, Ekinci, 2011, Doymus & Dogan, 2011):

a. Learning Together: In this technique, developed by Johnson & Johnson, learning objectives are determined primarily. Class is arranged for the groups to work, which are heterogeneously formed. Teaching materials are offered to students and individual assessment is definitely realized at the end of the group work. Topics are presented to the students in technological environments and their cooperation is ensured with the use of computer in this technique. Since it requires synchronic work, video

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conferencing, teleconferencing, and instant messaging tools can be utilized which allow synchronous communication. Realizing individual assessment is one of the most important factors in this technique. By realizing this assessment in the online environment via technological tools, it both enables a student to immediately see the results of the assessment and reduces the assessment time and labor of teachers. At the same time, records of students' achievements are kept easier, more realistic and detailed interpretations can be done by monitoring their developments by performing evaluations considering their previous achievements. In this case, the precautions to be taken related to the achievements of the students will be determined or it will enable them to act realistically and avoid wasting effort.

b. Teams-Games-Tournaments (TGT): In this technique, developed by DeVries & Edwards and used for evaluation of the course, students form heterogeneous groups, after the teacher ends lecture. Each group prepares within itself for the tournament by using materials related to the subject discussed. The two groups of similar levels go to tournament table and the tournament begins. Groups score points with the correct answers given to the questions. Successful group in the tournament competes with a group with a higher level of competency in the following days. The websites, created, facilitate the work of the teachers in using this technique. The teachers who register such websites as a user can prepare multiple choice or gap filling exams including items such as image, text, and audio. The teacher can enable all the students in class to see the questions via projector by connecting to this system in the classroom environment. Students can give the answer of their group by connecting to the system via their own mobile devices. System checks the answers for each question at the end of the period specified by the teacher and sends feedback to students' mobile devices. In addition, at the end of each question, the ranks are specified by projecting the scores gained by students or groups and the total scores. Since the system saves the students' score in the previous tournaments, it helps the teachers match the groups of similar levels of achievement before the lesson. The teacher's workload is reduced with the use of this technology and it eases the use of the technique in the class.

c. Group Investigation: This technique was developed by Sharan & Sharan. It is a learning technique in all the steps of which students take an active role. In this technique, teachers determine the main issues, students do so for the sub-topics in the classroom, and students, who have determined the same sub-topic, form a group. Students create a research plan on the subject they have determined, and they prepare and present a research report together in class at the end of the study. During the evaluation process, in addition to receiving the evaluation of other groups, the group assessment or individual assessment can also be realized. In this technique, based on that students conduct a research and present their research findings to the class, technological tools can be effectively used

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in the process of quickly and effectively accessing and recording the resources during the investigation. It facilitates students to interpret what they have learned by using the information and documents accessed and prepare presentations in order to present them to the class.

d. Constructive Controversy: In this technique, developed by Johnson & Johnson, students' research, listening to opposing views, understanding and persuasive skills are developing. Students form groups which advocate two opposing views about the research subject, determined by the teacher. The purpose of the discussion in the classroom is listening to and understanding other groups as well as defending their own opinion. The students are given the opportunity to research during the discussion, too. It would be a discussion without the winning side, and ends with the determination of consensus of students. In this technique, it is important that students quickly reach the information resources and use them to change the idea of the opposing group. The utilization of the technological tools at this stage will enable students both to question their own ideas and to check the accuracy of the opposing group's opinions.

e. Jigsaw Techniques: After the first technique, developed by Aronson & Associates, Jigsaw II, Jigsaw III and Jigsaw IV were developed, however the basic elements of all the techniques are the same. A group is created to work on a topic in this technique. Each member is provided with their own sub-topics. Students who have the same subtopic meet to form groups of experts. Expert groups search on their subject, specialize on the subject. Then, each member returns to their group and informs their group friends, the report or presentation is prepared as the group product. Group or individual assessments can be made in the assessment process. In the expert group, it is important that students receive in-depth information about their topics and specialize in their topics. At this stage, technological tools will help students reach different information sources. After the specialization phase, students are required to give information to their group friends. At this stage, the use of the presentations prepared by expert groups with the help of the technological tools will prevent the individual differences in the information given to the groups. That groups present their presentations prepared with the contributions of the expert group members with the help of the technological tools will save students from the constraint of explaining their knowledge just verbally and prepare a base to use multimedia elements such as picture, audio and video. In this case, students will use their mental skills to transform the knowledge into different forms, in this way it will both provide students with opportunities to improve their mental skills and enable an effective learning.
f. Student Teams Achievement Divisions (STAD): In the technique developed by Slavin & Associates, after the submission of content by teachers, students try to cover each other’s shortcomings and prepare

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themselves for the exams which will be held. Then individual assessment is made and group score is determined by the points each member of the group has. According to the previous success of the group, their progress is observed and the award is given to the group exceeds a certain criteria. It is easier for students to acquire knowledge, research the knowledge they acquired in-depth, reach to the different forms according to individual differences with the help of technological tools. Besides technological tools help implementation and evaluation of the individual test be easy and they facilitate forming and monitoring of the group points.

g. Team Accelerated Instruction (TAI): In the technique developed by Slavin & Associates, subtopics students will work on are determined by a pre-test. Each member studies a subtopic appropriate for their levels individually but gets help from the members of the group when needed. Members are evaluated by follow up tests at the end of each sub-topic. Students who fail the follow up are assisted by a teacher. Students who are successful in follow up test are given unit test, and group score is determined by points of the group members. Awards will be given to groups that meet specific criteria. The use of this technique is facilitated with the technological tools as it contains branched preparation of training content and also it ensures studies that can be carried out according to the individual differences of different students. With the help of technological tools, determining the level of each students, providing students study on contents appropriate for their levels, implementing and evaluating the follow-up, helping students that have failed, implementing and evaluating the unit tests to the students who have succeeded, generating group points become easier and so, workloads of the teachers are reduced and classes are more productive as the teachers only focus on guiding the students.

h. Cooperative Learning Structures: In this technique developed by Kagan, submitting the contents and determining the subjects are carried out through classroom discussion. Each group selects a topic and subtopics are decided for each member of a group. Each member informs the group friends with presentation about their subject as a result of individual studies. Then the group makes the group presentation in the classroom. Either group assessment or individual assessments can be made during the evaluation process. In this technique, technological tools can provide students researching each subject of them, accessing to resources, and preparing the presentation they will perform to the group friends. By fulfilling the duties of every member in the group, the ground for students to prepare the group presentations and perform it to the students in the class are provided. The use of technological tools in the assessment process ensures quick and easy evaluation.

i. Cooperative Integrated Reading & Composition (CIRC): This technique was developed by Stevens, Slavin & Associates. This technique is mostly

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used in the literacy education. Students study on meaningful reading and writing skills with activities such as reading aloud, making predictions about what they read, ask questions, summarizing, and essay writing in pairs. Group members complete the shortcomings of the other and they provide their own learning, as well. Implementation of this technique with the support of the technological tools provides different facilities in different phases. In reading instruction, sound recording is made during students reading aloud and it will enable them to listen themselves and identify deficiencies in pronunciation. Writing for note taking and audio recording tools can be used in the activities such as making predictions about what they read, summarizing and asking questions. It provides oppurtunities for students to communicate with each other regardless of the time and place and allows students to continue their study in outside school times. In the process of developing writing skills, in addition to doing exercises about writing essays, doing writing studies using the tools of instant messaging or mailing improve students writing skills to express themselves

Conclusion

There are benefits of the cooperative learning in terms of increasing the studens' academic success and gaining social skills. Because the students are actively involved in the learning environment, direct their own learning, combine the new informations with the previous ones, their academic success improves, their ability to reach information resources develops, their attitudes are affected in a positive way, their self confidence fosters, their communicative and writing skills improve, they gain cognitive and social skills. On the other hand, with the usage of cooperative learning, teachers have the opportunities to use current methods of evaluation and their responsibilities for the class management are reduced. (Hannigan, 1989, Johnson, Johnson & Smith, 1991, Johnson, Johnson & Holubec, 1994, Johnson, Johnson & Stanne, 2000, Simsek, Simsek ve Esen, 2009, Shindler, 2009).

Besides, with the use of cooperative learning, teachers may encounter some situations that need to be taken precautions during the planning and the implementing process of the course. There may be some students who don't fulfill their tasks in the group, in some groups all the work load may be left to a couple of students and students who have no contribution for the group may gain unearned advantages, ineffective students courage may be affected badly in the groups which has different students of different success levels, some students may want to come into prominence and the problems within the group may lead conflicts in the classes. (King, 1993, Johnson, Johnson & Holubec, 1994, Mulryan, 1994). Teachers can produce more convenient solution to many problems with the use of technological tools in the teaching environment.

Technology-supported collaborative learning environment allows producing projects which they study together in computer, mobile learning tools and internet assisted environments (Ozdamli & Uzunboylu, 2008). Students can continue to work independently of time and space. In particular, simultaneous

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virtual classroom tools offer versatile communication opportunities to learners by providing mutually among users simultaneous video, voice and data communications in an online environments (Cinar et al, 2011).

Technology-supported collaborative learning environments facilitates teachers' planning, tracing the process, the teacher's intervention when necessary usage of all resources. Zhi & Liu (2007) stated in their study that technology-supported cooperative work environments facilitate reaching statistical informations related to students for the teachers and teachers are satisfied with it. The creation of positive interdependence within the group, evaluation of individual performance, ensuring interaction, the development of social skills and monitoring of group process can be made more easily thanks to the technological tools. Johnson & Johnson (2013) reported the opinion that it is beneficial in many aspects of the use of cooperative learning environment as used in the training of technological tools that make our lives easier. All these considerations show that supporting collaborative learning with technological tools would be useful.

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