STUDENTS' PERCEPTIONS ABOUT TECHNOLOGY INTEGRATED COLLABORATIVE SCIENCE PROJECTS: AN ACTION RESEARCH CASE STUDY

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ABSTRACT

STUDENTS' PERCEPTIONS ABOUT TECHNOLOGY INTEGRATED COLLABORATIVE SCIENCE PROJECTS: AN ACTION RESEARCH CASE STUDY

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This study examined seventh grade students' perceptions about collaborative learning, peer and teacher support, project based learning, technology integration into Science and Technology lesson and forum. The research included the implementation of collaborative project-based learning during 10 weeks. Students as groups created educational web sites on Science and Technology subjects by working co9llaboratively in Information Technologies lessons.

This research was an action research case study. The major purpose of the study was to enhance the collaborative skills of students by applying a new practice. Besides this, it was aimed that all students could use computer more comfortably and by discovering and could use their computer skills in other disciplines.

Qualitative data were collected through student interviews, observations, web site evaluation rubrics, and forum archives. It was seen that students enjoyed project-based learning and they gained the habit of working together developed with the help of collaborative group work. Moreover, they started to appreciate peer support and learned to respect each other's ideas. According to results, aware of responsibility of both low-achievers and high achievers increased. The feeling of self-confidence they gained when they completed the project helped them to overcome their fear to use computer. Most of the students preferred using computer in their projects or homework from other disciplines.

Keywords: Collaborative Learning; Project-Based Learning; Technology Integration; Science and Technology; Elementary School Students

ÖZ

ÖĞRENCİLERİN TEKNOLOJİ ENTEGRE EDİLMİŞ KATILIMLI FEN PROJELERİ HAKKINDAKİ ALGILARI: EYLEM ARAŞTIRMASI DURUM ÇALIŞMASI

Yaşar, Derya

Yüksek Lisans, Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümü

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Bu çalışmada 7. sınıf öğrencilerinin katılımlı öğrenme, öğrenci ve öğretmen desteği, proje tabanlı öğrenme, teknoloji entegrasyonu ve forum hakkındaki algıları incelenmiştir. Araştırma 10 hafta süren bir çalışma olup katılımlı proje tabanlı öğrenme uygulamasını içermektedir. Öğrenciler, Bilişim Teknolojileri dersinde grup çalışması yaparak Fen ve Teknoloji konuları üzerine eğitsel web sayfaları oluşturmuşlardır.

Bu araştırma bir durum çalışması olup aynı zamanda eylem araştırmasıdır. Çalışmanın başlıca sebebi öğrencilerin birlikte çalışma ve iletişim becerilerinin geliştirilmesidir. Bunun yanında, tüm öğrencilerin bilgisayarı daha rahat ve keşfederek öğrenmeleri ve bilgisayar becerilerini diğer alanlarda kullanmaları amaçlanmıştır.

Nitel veri öğrenci görüşmeleri, gözlem, web sayfası değerlendirme formu ve forum arşivi aracılığıyla toplanmıştır. Öğrencinin katılımlı proje tabanlı öğrenmeden hoşlandığı ve grup çalışması yardımıyla birlikte çalışma alışkanlığı kazandıkları görülmüştür. Ayrıca, öğrenciler grup arkadaşlarının desteklerine değer vermeye başladılar ve birbirlerinin fikirlerine saygı göstermeyi öğrendiler. Çalışmanın sonucuna göre, hem düşük seviyeli öğrenciler hem de başarılı öğrencilerin sorumluluk bilinci arttı. Öğrencilerin projeyi tamamladıklarında kazandıkları özgüven duygusu bazı öğrencilerin bilgisayar kullanma korkusunu yenmelerinde yardımcı oldu. Öğrencilerin çoğu, diğer derslerin ödevlerinde veya projelerinde bilgisayar kullanmayı tercih ettiler.

Anahtar Kelimeler: Katılımlı Öğrenme; Proje-Tabanlı Öğrenme, Teknoloji Entegrasyonu, Fen ve Teknoloji, İlköğretim 2. Kademe Öğrencileri

To My Family

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CHAPTER 1

INTRODUCTION

1.1. Background of the study

In recent years, the emphasis in education has been shifting from teacher-centered to student-centered, from theoretical to practical and from single discipline to multidisciplinary (Jarvis, Holford & Griffin, 2003, p. 2). Project-based learning accommodates these changes by providing opportunities for active, practical and interdisciplinary learning (Education Development Center, 2003, p.2). Students make relations between their acquired knowledge and its application by "learning by doing" in PBL (Daniel p.272), thus they engage in learning process actively and apply their knowledge to fulfill projects.

Learning environments should have the characteristics of being "active, intentional, constructive, authentic and cooperative" so that meaningful learning occurs (Jonassen, Howland, Marra & Crismond, 2008, p.2). In order to make the acquired knowledge productive, students should be provided with a realistic task, interaction with peers and guidance (Corte, Verschaffel, Entwistle & Merriënboer, 2003, p.3). In this context, collaborative project-based learning was applied in this study. Students were provided with a task and were expected to articulate their knowledge by applying it to design a web site in a collaborative learning environment. They worked to publish an educational web site constructed on their own knowledge by cooperating with their peers in an authentic environment and finally producing a webpage.

With implementing constructivist strategies in learning processes, the focus has been changed to construction and control of students' own learning, development in higher order thinking skills, reflecting, sharing and working collaboratively to reconstruct (Condie & Livingston, 2007, p. 339). Students need not only to construct knowledge but also to be characterized by certain skills to be able to be successful in life. With the help of collaborative learning, in addition to gaining knowledge, it is aimed to support students' "interpersonal skills," "personal and professional development" and to "encourage cooperation" (Bingham & Daniels, 1998, p. 6).

Due to the fact that computers and Internet technologies open a huge world of knowledge, not only learning how to use computer but also learning through computers and Internet technologies has become unavoidable (Condie & Livingston, 2007, p. 338). In this study, technology was integrated to the collaborative project-based learning environment. The students in this study used their computer skills, including designing web site, searching on the Internet and recording audio to create a science project. Computers were not only a medium for the project, but they contributed to students' learning process of both web site design and science subjects because they made their knowledge meaningful with technology integrated experiences (Chanlin, 2008, p.55).

This investigation will help understand the perceptions of 7th grade students and improve the practice about collaborative project-based learning and the use of computer and Internet technologies while creating Science and Technology project collaboratively.

1.2. Purpose of the study

The purpose of this study was to investigate the experiences of 7th grade students in Information Technologies lessons in order to understand how they perceive a collaborative web-based project on science subjects. The aim of the investigation

was to improve collaborative skills, autonomous learning skills and motivation of the students by implementing a new practice.

1.3. Research questions

1. How the learners perceive collaborative work in the Information Technologies lessons?

- **a.** How the learners perceive collaborative group work?
- **b.** How the learners perceive peer support?

2. How the learners perceive the support of Science and Technology and Information Technologies teachers?

3. How the learners perceive developing web pages on science subjects in the project-based learning environment?

- **a.** How the learners perceive project-based learning in Information Technologies lessons?
- **b.** How the learners perceive using technology to prepare a science project?
- **c.** How the learners perceive Information Technologies lessons supported with an asynchronous communication tool?

1.4. Significance of the study

This study has been decided to be carried out owing to several aspects. The first goal was to develop students' collaborative working skills because students learn and construct knowledge through social interaction rather than individual discovery as explained in Piaget's theory of constructivism, which puts the learner at the center of learning process (as cited in Thompson & Ku, 2006, p. 362). After realizing that students failed to work together and respect their friends' ideas and that relatively hardworking students gave importance only to their own ideas while less successful students had to be silent, the researcher decided that there was no effective interaction among learners. The researcher aimed to enhance interaction among

learners by making group projects based on the results of the studies of Gupta (2004), Webb and Mastergeorge (2003) and Gillies (2003). It is expected that group work will enhance the communication between students and their collaborative working skills.

Because of being teacher of students for three years in Information Technologies lessons, the researcher became able to recognize that students gained computer skills by imitating their teachers. Most of the students were not able to carry out tasks without watching their teacher while doing similar tasks and repeating the process. That made it difficult for the students to construct their own knowledge. This research also aims to provide students with the ability to build their own projects through pursuing research, using their creativity, discovering, solving problems and supporting each other.

The researcher decided to make the project interdisciplinary as I thought that students must learn to use computer in other areas rather than learning to use computer for its own sake. As a starting point, Science and Technology lesson, which was one of the favorite lessons of these students, was selected to teach them to integrate computer usage in a different field. Therefore, at the end of the study the students were expected to know why they tried to get computer skills by realizing such an interdisciplinary project in addition to learning science and computer.

Especially after evaluating students without giving any grades, the researcher observed that there occurred a decrease in the amount of students' motivation, as a result of which they started to do homework without giving necessary consideration. This study motivates students, for the projects that students develop will be published as educational projects on the school web site in this implementation. This makes the project a real life project and increase students' motivation.

This study combines many crucial components of constructive learning environment. Students will develop collaborative and communication skills while experiencing a real life group projects and integrating their computer skills into another subject. There are few researches including all these crucial aspects and there is also little knowledge in the literature related with the specific subject of the study especially on primary students. Neo (2003) searched on university students and found that collaborative learning improved students' problem solving, critical thinking skills and awareness of responsibility, and it enabled students to learn to work collaboratively. Chanlin's research (2008) indicated that students (aged 10-11) developed ability to synthesize, go into detail and get involved in tasks and use their computer skills to support their work (p.55). Asan and Haliloğlu (2005) similarly found positive effect of the implementation of a project based learning on Science and Technology and Mathematics learning in computer classroom. This study focuses also on enhancing practice and solving existing problems different from these researches.

This study is expected to contribute to the literature in exploring how 7th grade students perceive collaborative project-based learning, the use of Information Technologies in other lessons, Science and Technology, and a real life project. It is also expected to support the practice by determining better practice issues.

1.5. Definition of terms

Project-based learning

Project-based learning is the learning model which enables students to gain meaningful knowledge and problem solving skills, to develop autonomous learning skills, and to create a real life project (The Buck Institute for Education, BIE, 2007 as cited in Saracaloğlu, Akamca & Yeşildere, 2006, p. 244).

Collaborative learning

Collaborative learning is learning with in pairs or small groups whose all members actively engage in tasks in learning environments designed intentionally by the teacher providing deeply understanding of the learning objectives of the course (Barkley, Cross & Major, 2005, pp. 4-5).

Asynchronous Communication

It is a form of online interaction that offers online communities physically difficult to maintain where contributors do not have to send their posts at the same time (Love & Isles, 2006).

CHAPTER 2

LITERATURE REVIEW

In this chapter, the literature related with social constructivism, K-12 students, collaborative learning, project-based learning, computers in education and asynchronous communication were reviewed. In this wise, recent studies related with subject of this research, related terms and concepts were focused. At the end of the chapter, summary was presented.

2.1. Social constructivism

As the amount of knowledge students must get increase, students are required to learn how to learn. They must construct their knowledge from their own experiences, and learning components must be meaningful and rational to learners (Jadallah, 2000. p. 221). Generally, these are theoretically acceptable by all constructivists. However, according to social constructivists, the main issue of learning process is social interaction which enables learners to share, construct their ideas and develop essential language skills (Jadallah, 2000. p. 221).

In order to realize social constructivist issues in practice, first of all, constructivist learning environments should supply to learners collaborative and individual activities with meaningful contexts to gain needed knowledge and skills (Berge, 2002, p. 184). As the second point, both students and the teacher should contribute to learning process (Jadallah, 2000, p. 225). Learners should actively engage in the learning process, construct their own knowledge and reconstruct it by sharing with their classmates and the teacher (Jadallah, 2000. p. 221). The third point is that students should control their own learning (Berge, 2002, p. 183). Lastly, according to Berge (2002), when students believe that their ideas are valuable and worthy to share with others, they can take the responsibility of their own knowledge in an

environment having high levels of interaction from different perspectives, flexibility in time and place, and structure that does not exceed their abilities (p. 185).

Students make the knowledge meaningful by conflicting with each other (Hunt, 1997). Social learning environments make students become more productive, have the ability to explain and rationalize their ideas, realize different point of views, respect for others' ideas, work together, develop collaborative skills, and have fun (Watson, 2001, pp. 143-144).

2.2. K-12 students

With the leadership of McCombs, learning principles for K-12 education are determined after many analyzing and synthesizing steps. Validity of learner-centered psychology principles (LCPs) controlled researched-based approaches and resulted that LCPs under certain categories provide a positive learning environment that brings more successful students experiences (McCombs, 2003, pp. 93-95). According to the principles, K-12 education needs to be more structured, planned and enriched with environmental factors. Students must practice their knowledge in the learning process and there must be a social environment that provides interaction, facilitates creative and strategic thinking, reflects students' individual differences and is appropriate for students' development.

In many implementations, computer technology such as games, multimedia, and communication through computers and Internet was integrated to the learning process in order to provide students enriched learning environment. According to the research done by Orhan and Akkoyunlu (2004) with a developed questionnaire implemented on primary students, most of the students use the Internet frequently and while students get older, it is seen that the frequency of the Internet use is rising and the aim of using the Internet is changing from games to obtaining information, communication, and so on (p. 107).

Frid (2001) did a research on the factors that affect primary school students' learning about mathematical thinking in Australia, whose most of the schools have computer and Internet technology. In this research it was determined that students became confident to do tasks, tried to implement different solutions to problems, made reasoning and tried to understand the result of events, worked together, shared ideas, listened and appreciated each other's ideas. According to the result of the study, communication structure of the web based tool -including asynchronous discussion, involving activities for a range levels of ability and insisting on reflecting and contributing instead of giving right answer to the problem and blended with a classroom teaching-, support from adult supervisor, and interaction with other students have a key influence on students' reaching these objectives (p. 17).

2.3. Collaborative learning

Collaborative learning includes not only constructing knowledge but also "like explaining, mutual assistance, and mutual regularization or disagreement, which in turn generate respective cognitive processes, e.g. knowledge elicitation, internalization, or reduced cognitive load through group-working activities" (Hron &.Friedrich, 2003, p. 70). Collaborative learning does not refer to group working only -students can complete a task individually- but to discussing with their classmates and sharing their ideas.

Planning and coordination is very important at setting, creating the environment, guiding and evaluating the process stages to realize development of desired skills and construction of knowledge (Palloff & Pratt, 2006, pp. 980-981). Most of challenges can be overcome by adding face-to-face meetings and facilitating communication between group members. For example, in the research by Thompson and Ku (2006), the students were faced with conflicts between group members such as non-working or non-reachable group members, and longitudinal discussions (p. 367). These problems can be solved through determined rules and arranged regular meetings by

the group members. But the most important issue is to create positive attitude toward collaboration and obtain effective communication by making students recognize the importance of exchanging and sharing knowledge or ideas among members and the pleasure achieving this with technological tools (p. 368). Students must be informed about collaborative learning and how they learn collaboratively as early as possible (Yılmaz & Seyrek, 2001, p. 48). Furthermore, teachers can make students remember that they can apply to their teachers when they have any problems related with group members, and so as to prevent group conflicts, and students must be informed about individual accountability besides group responsibility (p. 373).

One of the problems which researchers had to deal with during collaborative learning is forming groups. Yılmaz and Seyrek (2001) found that both student selected groups and random groups had difficulties; the former caused either very motivated or not motivated groups; the latter were affected strongly by the achievement of the group (p. 47). Gödek stated that homogenous groups were good for high ability students and heterogeneous groups were good for low ability students (2004, p.32). On the other hand, Cohen (1994) believed that heterogeneous grouping may lead to high achiever assisting low achiever groups (p. 63) and this may make low achievers passive learners.

Another problem is grading the members of the group as stated in the research of Yılmaz and Seyrek (2001, p.47). According to their research, it can be prevented by grading for each member and assigning another grade for their groups. Individual grades are needed for individual accountability and group grades make members to support each other (Barkley, Cross & Major, 2005, p.83).

Researches on student satisfaction indicated that attitudes toward subject matter, motivation, interaction with the instructor and student, and personal development of

students were affected positively from collaborative learning (as cited in Barkley et al., 2005, pp. 16-20). On the other hand, there are also researches (Chiu, 2002) that did not find significant difference in students' skills and attitudes between collaborative teamwork and traditional settings. According to Barkley et al. (2005) the reason might be to design the instruction carefully for collaborative learning and not to give the same importance to traditional classroom setting, or because of inappropriate crucial components of collaborative settings such as unreachable group mates, unstructured assessment, context, or teacher guidance (pp. 22-23).

2.4. Project-based learning

According to BIE (2007), project-based learning is "a systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks". Sidawi (2005) sees project-based learning as an approach creating a bridge between knowledge and action (p. 21). Project-based learning is a term-focused approach and it reconstructs students' knowledge continuously during the project term (Saracaloğlu, Akamca & Yeşildere, 2006, p. 244). Therefore, it provides not only practicing what the students have learned but it also improves the quality of their learning (BIE, 2007).

Researches of Özdener and Özçoban (2004), Doppelt (2003), and Gültekin (2005) indicated that project-based learning approach had a positive impact on students' learning. Information becomes meaningful by students' asking, researching, solving, debating, sharing, analyzing, synthesizing and designing (Blumenfeld, Soloway, Marx, Krajcik, Guzdial & Palincsar, 1991, p. 371). Students learn by applying their knowledge to real-life problems in project-based learning (Kolodner, Camp, Crismond, Fasse, Gray, Holbrook, Puntambekar & Ryan, 2003, p. 505). As a result of these, it supports students in becoming rational, in having ability to solve problems in limited time, in thinking creatively and critically, in having responsibility and in working collaboratively (Erdem, 2002, p. 178).

Asan and Haliloğlu (2005) found that project based learning developed students' computer and collaboration skills. Chanlin (2008) stated that it improved students' higher-order skills; but guidance of teacher is one of the key components (p.64). The research of Esmaiel (2006) was resulted in that project based learning improved students' learning. Well-structured project-based learning can enhance concrete learning process, integration of pre and post knowledge and knowledge about different disciplines, and meaningful learning (Helle, Tynjälä & Olkinuora, 2006, p.308).

Students had a good time with funny learning activities, felt proud of their products, develop their collaborative skills, motivated more and learned more (Achilles and Hoover, 1996, p.17). On the other hand, they also stated disadvantages of problem-based learning as it was needed more time and effort to create the structure and learning environment like Helle, Tynjälä and Olkinuora (2006) affirmed. Brown and Abell (2007) said that teachers had difficulties with managing students' learning process in project-based learning environment (p.61).

According to Korkmaz and Kaptan (2001), project based learning is one of the leading methods that can be used in Science and Technology lessons because it provides students to transfer their knowledge to daily life and to solve real life problems more comfortably (p. 194). They (2002) found that there was a significant difference in academic achievement, personality and efficiency in study time between students in traditional learning environment and students in project-based learning environment (p.94).

2.5. Computers in education

Although controversies about contribution of computers to education are going on, they start to become a part of our educational system rapidly (Dwyer, 1996, p. 25). Learning environments including computers encourage students' achievement, collaborative work and sharing, a possibility to choose appropriate approaches and

access to rich source of data timely (Morton, 1996, p. 417). According to final report of "Kickstart Iniative," technology integrated instruction provides time and cost savings, effectiveness in learning process, and learning more in lessons such as language, arts, math, social studies and science (Starr, 1996, p. 52).

Computers provide many technologies for learning environments such as games, multimedia tools, interactive multimedia tools, distance learning platforms, communication ways, and so on. This study focuses on interactive multimedia technology. Hirschbuhl (1996) states that interactive multimedia facilitates learners' constructing their knowledge through using higher-order thinking with the help of audio, video, graphic and textual information and also engaging in learning process actively by navigation, accessing and manipulating (p. 3).

İşman (2002) lists five issues that educational technologies contribute to education when it is actively used as follows**:**

- Teachers are able to gain new skills rapidly and transfer it to learning environment
- Students can be provided with learning environments considering their individual differences
- Students can be included in learning process actively
- Students can develop projects collaboratively even if they are at different places
- Students and teachers are provided with global education

Furthermore, technology attracts students and increases their motivation, provides access to information, and enhances presentation of information and structure of the process (Blumenfeld, Soloway, Marx, Krajcik, Guzdial & Palincsar, 1991, pp. 384-

386). From the literature, we can say that if the computer-supported learning environments are designed carefully, intentionally and professionally, it enhances learning process. Computers have the potential to support and enhance learning process (Waight, Abd-El-Khalick, 2006, p. 176). They facilitate transfer of information to knowledge, active engagement in learning process and gaining computer skills in addition to learning about other disciplines such as science; however, there are also threats that they pose such as inappropriate design of the instruction, negative attitudes of students towards computer, difficulty in synthesizing and integrating the knowledge and a lack of basic computer skills (Matovinovic & Nocente, 2000, pp. 116-117).

2.6. Asynchronous communication

Love and Isles (2006) express that state and national curriculum authorities in Australia increasingly promote asynchronous online discussions to provide better communication among known and unknown participants including students, teachers, and experts (p. 210); however, conflicts whether online discussions are more efficient than face-to-face discussions are going on. The result of the study investigating the perceived differences between face-to-face discussions and online discussions shows that online discussions are more efficient only in atmosphere scores such as authenticity, comfort, aggression, equal access and dominance (Wang & Woo, 2007, pp. 281-284). This does not mean that online discussions should place face-to-face discussions in education; but it can support face-to-face communication

Another research done through online collaborative experiences of graduate students points to "ineffective communication, conflict among group members, and negative attitude toward group work posed major challenges to online collaboration. The results also showed that the more collaborative groups produced better quality projects and had more positive attitudes toward online collaborative learning" (Thompson & Ku, 2006, p. 361). As a result, in order to be successful in

asynchronous communication, providing and facilitating effective communication among students is essential; therefore, the role of instructors is crucial.

According to Levine (2007), online discussion platforms provide opportunities to go one step further from the boundaries of face-to-face instruction (p. 68). Levine (2007) states that instructors use discussion platforms, i.e. asynchronous communication, owing to one or more of the following reasons:

- Create an Environment, make Learning efficient
- Establish Rules, and Provide preparation for Instruction
- Guide the Threaded Discussion
- Pose Meaningful Questions and Problems
- Focus on the Highest Three Levels of the Cognitive Domain
- Allow Individualization Without Isolation
- Be Sensitive to Nonparticipation
- Stimulate Participation
- Encourage Reflection
- Summarize Key Ideas

In this study, asynchronous communication is used for helping students' learning, revealing individual differences and respecting them, developing higher order thinking skills such as problem solving and critical thinking, promoting reflection and studying collaboratively.

2.7. Summary

Literature was explored in how students' learning processes were affected from similar implementations, what was and was not collaborative learning, what were key points and difficulties of collaborative and project-based learning settings, what

was project-based learning, did computers have significant contribution to learning process, why asynchronous communication was used as supporting component of face-to-face interaction, and were there significant contribution of it. In spite of the insignificant and negative results, literature mostly supports the claim collaborative project-based learning whose basis is brought up by social constructivists provides students to gain the objectives as in the researches of Chanlin (2008), Neo (2003), Asan and Haliloğlu (2005) and etc. They construct their own knowledge by applying their theoretical knowledge and practicing in addition to improving their collaborative skills.

CHAPTER 3

METHODOLOGY

This chapter provides detailed information about the research, regarding the research design and its implementation. Within this context, it includes the design of the study, the selection of participants, the instruments of the study, the procedures of the study, analysis of the data, the validity and reliability of the study, the assumptions and limitations of the study, the role of the researcher and the summary of the chapter.

3.1. Overall research design

This study is a qualitative case study conducted by an action research. As Yıldırım and Şimşek (2005) state, a case study provides the possibility to analyze a unique case in detail and tries to answer questions of how and why. Due to the fact that this study investigates a case, that is, perceptions of 15 seventh grade students at Yeşilöz Primary School about the implementation of technology integrated collaborative project-based learning in science; it is a single case study.

Action research is an approach that enables practitioners to develop themselves personally and professionally by investigating and evaluating their work (McNiff & Whitehead, 2005). The main difference between action research and other types of researches is that conductors of the researches are practitioners instead of academic researchers (Johnson & Christensen, 2004). Within this context, the teacher as the researcher at the same time has done the research to elicit students' performances.

According to McNiff (1997), the researcher focuses on students' performance to learn how students act or on teacher's practices to learn how students are affected (as cited in Schmuck, 2006). In this research, the researcher focused on the students'

perceptions to enhance the practice and teachers are the best researchers to investigate and reflect the result to the practice (McNiff, 2005) as they have unique learning environments and they are the only professionals in that learning environment. Due to the fact that the learning environment is local, the research cannot be generalized.

According to the levels of participation in action research (Figure 1) figured out by Fraenkel and Wallen (2006, p. 570), participants of this study were level 1. According to Fraenkel and Wallen (2006), elementary students must not participate beyond level 3. In this study, they only provide information for the study without knowing the purpose of the study and receiving findings. The reason for this is that the researcher wanted to get more reliable and valid data owing to the fact that if the participants knew the purpose of the study, they might be affected while answering the interview questions. That is, they might answer in positive manner in terms of the purpose of the study to make their teachers pleased.

Source: Adapted from *How to Design and Evaluate Research in Education* by J. R. Fraenkel & N. E. Wallen, 2006, (6th.), New York: McGraw-Hill, p.570.

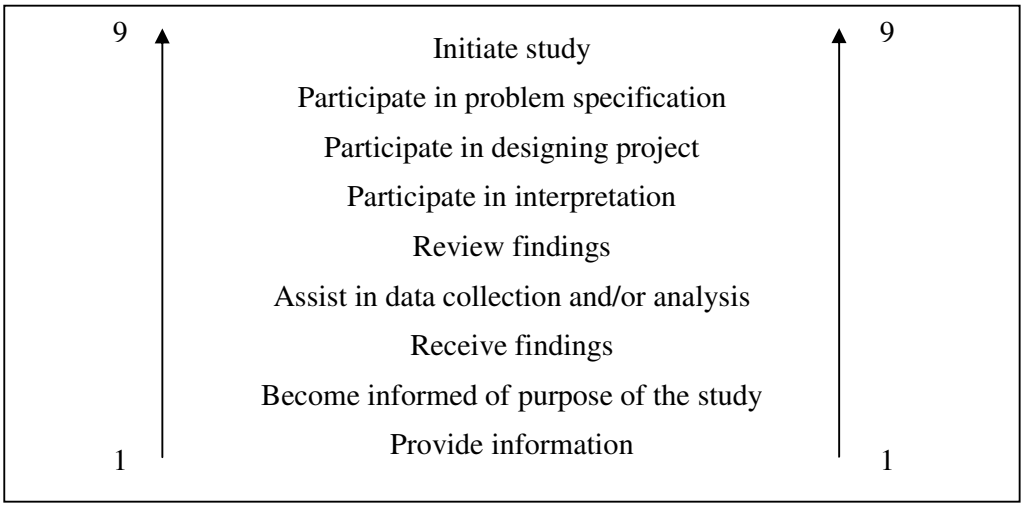

Figure 1 Levels of participation in action research

As Holly, Arhar and Kasten (2005) state, action research is generally applied to solve a problem. Therefore, this study is designed to solve the problems of the teachers that they have encountered during their previous experiences in their classes. According to the teacher's experiences before doing this action research, the following problems had observed:

1. Students did not want to do anything together. Even when the teacher wanted to hold a party, they could not have fun together.
2. Students were not respectful to each other's ideas in classroom discussions. When the teacher held class discussions, nobody listened to others' ideas and never thought that they might benefit from them; they were always in competition with each other.
3. Students neglected those who were less successful. The teacher observed students also in other lessons. High achiever students did not give a chance to lower-achiever students to answer questions; i.e. they thought that low achievers could not be able solve or perform well.
4. Some of the low-achiever students did not complete their tasks and spend considerable effort to learn while doing their tasks.
5. Some of the students, except for a few students who had computers at home and high-achievers in Information Technologies lessons, were afraid of using computer especially when a problem occurred while they were using it; i.e. they could not have used computer comfortably.
6. They did not try to learn by testing method or asking their friends; instead, they asked their teachers whenever they did not know how to do something.
7. Some of the students complained before the study about why they would have done such activities if they had not been graded from Information Technologies lessons in their school report.

As the teacher observed all of these problems and wanted to solve them, I decided to implement a new practice. I examined the literature and realized that the collaborative works had a great impact on students' communications and improved computer skills. Therefore, I decided to plan and implement technology integrated collaborative project work in Science and Technology lesson and tried to investigate students' perceptions about this application and learning environment. In this study, with collaborative characteristic of the project, students could learn how to work collaboratively by sharing, helping, respecting, and so on; and in addition to the fact that they would be aware of their responsibility, they tried to solve problems and construct their knowledge on their own by getting help from their peers and applying teacher support as a last resort. Furthermore, with integrating technology to science project, they would see that they could use their computer skills in other disciplines as well and use computer more comfortably.

After all of these explanations and the expert views, it can be said that key features of the action research are:

- Teacher's being the conductor of the research
- Focusing on the students' perceptions to solve problems and enhance the case
- Contributing to the improvement of the practice.

Schmuck presents two models of action research as proactive and responsive action research. Proactive action research is the application and investigation of a new practice whereas responsive action research is intended to enhance existing situation (Schmuck, 2006). In this study, proactive action research strategies are used. Figure 2 shows the steps of this proactive action research and table 1 gives the detailed information for each step.

Source: Adapted from *Practical Action Research for Change* by R. A. Schmuck, 2006, (2nd.), California: Thousand Oaks, p. 33.

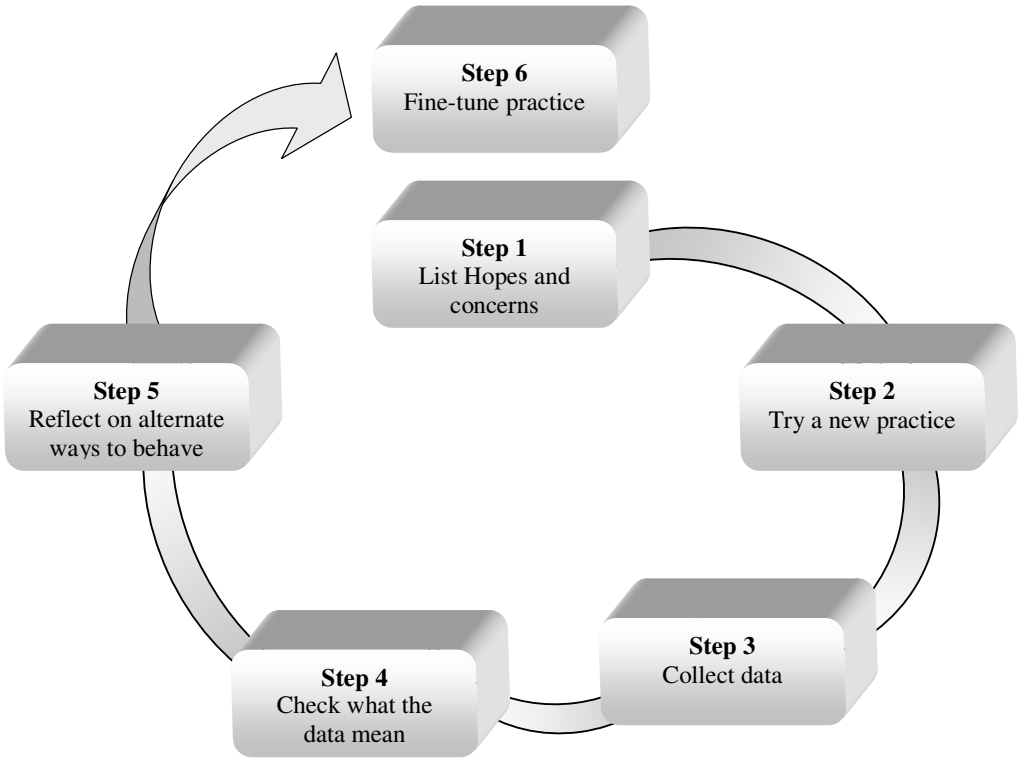

Figure 2 Steps of proactive action research

Table 1 Steps and actions of proactive action research

Steps	Actions
Step 1	Hopes Students will enjoy web design Students will also enjoy learning science subjects Students will be motivated as they like competitions (They said that they would attend a web site competition with their projects)

Table 1 (continued)

	Concerns Some of the students might be rude toward their friends and their ideas Some of the students might neglect their low-achiever friends Some of the students might not work as a group Some of the students might not work hard Some of the students might not try to solve problems without applying teacher support directly Some of low-achiever students might not take their own responsibility and complete their tasks Some of low achiever students might only try to hand in but not try to learn Some of the students might have a difficulty in different sides of the program from other Office programs they have learned. All students might not be able to integrate their computer skills into another subject
Step 2	A new way; to provide students to work collaboratively to provide students with learner-centered real life projects to integrate computer skills into science project to support students' collaboration through an asynchronous tool

Table 1 (continued)

Step 3	The teacher will observe and fill out three observation forms during the study The teacher will achieve the forum records The teacher will evaluate students' web sites with a rubric The teacher will do interview with each participant
Step 4	The teacher will decode the interviews
Step 5	The teacher evaluates the success of projects and students with the help of web site evaluation rubric The teacher analyzes observation forms The teacher analyzes forum records
Step 6	The teacher will summarize negative and positive experiences to light for the next studies in an action plan

3.2. Participants and sampling

The subjects of the study are 15 seventh grade students (aged between 12 -14). Table 2 below represents the demographic characteristics of the participants in this study:

Table 2 Students' characteristics

	Students	*N*	*%*
Residence	From Yeşilöz	3	20
	From other villages	12	80
Possessing computer at home	Having computers at home	4	26,66
	Lacking computers at home	11	73,33
Having Internet connection at home	Having Internet connection at home	2	13,33
	Lacking any Internet connection at home	13	86,66
Total		15	100

None of the students has learned web site design before and none has used any kind of forums before or taken a course in blended environment. Moreover, their homework done for lessons has been placed in teachers' cases generally without being used by anyone. Furthermore, students have not been accustomed to sharing and working collaboratively. Although the researcher tried to make them respect their friends' ideas, I was not able to be successful. Some of the students, especially students who do not have computers at their home, used computer with the fear of making mistakes. Finally, their written expressions were not adequately good.

3.3. Context and learning environment

The researcher is an Information Technologies course teacher and the course was conducted one hour per week. Lessons were carried out in the computer laboratory and there were twenty computers for students. Placement of the computers in the laboratory was in the U-shaped and all of the computers connected to the Internet.

Student projects were conducted in "I am creating web site" unit in their course book and it took 10 weeks. Students learned how to design a web site and did their project out of the lesson. They again used computers in the laboratory as most of them did not have computer at their home and nobody had Internet connection. Therefore, they had to do their projects in their free time at school mostly such as their vacant hours, breaks, lunch times, and long breaks between the lessons and "the Level Determination Exam (SBS)" courses. Furthermore, they had to use computers in a laboratory where other students at the school made use of at the same time when they used them in long breaks before SBS courses. That is, they had to find a free computer to work and they had to study in a crowded place.

3.4. Procedures

The collaborative project-based learning strategy was implemented in the Information Technologies course under the guidance of the Information Technologies teacher. At the beginning of the study, the students and parents were asked for their confirmation of the "Voluntary Attendance Form" (*Appendix E*) and "Parent Confirmation Letter" (*Appendix F*). The implementation was completed at the end of 10 weeks. 7th grade students learned how to design a web site in the course context and prepared their projects in their free time. Besides web site designing, the researcher was also a guide for collaborative group work during the project term.

To provide the most efficient work conditions and motivate students, students were let to form their own groups. That is, free form of student selection techniques was used. The researcher decided to student selected groups as students work more efficiently when their group mates have similar needs and backgrounds like Strang stated (1958, p.8) and they will also work with such people in a real life. This provided students to feel comfortable and to be more motivated for collaborative work as supported by Brookfield and Preskill (1999); furthermore, this also brought more homogenous groups according to Fiechtner and Davis (1992) (as cited in

Barkley, Cross, and Major, 2005, p. 47). When the teacher had tried to form heterogeneous groups by teacher selected method; groups would have been high achiever assisting low achiever which was undesired objective of group works as stated in Cohen's book (1994, p.63). Each group was composed of three students, so five groups were formed as a result of this process.

Students were informed that the school would attend a web site competition with the most successful project among five groups' projects. Furthermore, all projects would be published on the Internet. In addition to these, they were informed about collaborative group work.

The project work was supported with an asynchronous communication tool (forum). At the beginning of the project term, students learned how to use forums and as a motivation component, the instructor mentioned about forums from different job communities and explained why they used those kinds of tools. Before using forum, they were informed about rules through the forum. Rules were emphasized so that students were respectful for others' ideas. Their applying to the teacher as a last resort when it was needed was one of the most crucial rules.

Students were given task schedule including weekly subjects and their deadlines (*Appendix D*) and they completed their projects step by step, and at each step they were said to send completed parts through the forum.

The theme for the group projects was chosen as a web site on Science and Technology subjects. The researcher and the Science and Technology teacher determined to give the subjects to the groups. Because of the spiral structure of the curriculum, students had enough pre-knowledge to make research about 7^{th} grade subjects; therefore, subjects were from 7^{th} grade subjects.

Group mates shared the subtopics of their subjects and did the tasks seen in *Appendix D*. Some of the tasks were done as a group and some of them by individually. Students were informed that project works would be evaluated both as a group and individually to make all students spend effort to develop their projects. To get high mark from their task, students had to fulfill both their tasks and what was needed for their group work.

Students got together to perform their tasks, to share all ideas and to take group decisions. All members were responsible from group tasks, their own tasks and being helpful to their group mates. They were also informed that they could tell their instructor the problems related with group conflicts. Table 3 shows tasks with time periods and actions students followed during the project work.

In the first project term, in the middle and at the end of the project term, the researcher filled out the observation forms. After all tasks were completed, students handed in their projects to their Information Technologies teacher. Projects were evaluated according to the evaluation rubric (*Appendix C*). At the end of the project work, the interviews (*Appendix A*) were conducted with all of the participants individually and recorded with a tape recorder.

Table 3 Project task schedule

Time period	Tasks	Action
Week 1	Researching the subject Determining subtopics Sharing subtopics	Students did web based-search supported by the course book. They determined the subtopics
Week 2-3	Researching for subtopics	Students collected data for their own subtopics

Table 3 (continued)

Week 4	Designing homepage	Each group got together and designed their homepage together
Week 5	Completing homepage design Designing page templates	Students made needed corrections and handed in their homepages as groups. They also decided their page templates and designed it.
Week 6-7	Preparing web pages	Students prepared their own pages constructed on the page template
Week 8-9	Unifying web pages	Groups unified their members' web pages after controlling consistency of web pages and correcting the mistakes
At the end of Week 9	Handing in the first draft	Groups handed in their web site to take final consultation from the teacher
Week 10	Delivering the project	Groups delivered the science projects.

3.5. Course assessment

Students were assessed as a group and individually for each task as in Table 3. They had the responsibility to do both their tasks and whatever was needed for collaborative group work such as helping their group mates, warming them, arranging group meetings and applying teacher support. At the end of each task, students got pluses and minuses; however, they got graded twice, one of which for group work and the other for their individual performance.

At the end of the project term, pluses and minuses students got affected their marks and they got performance marks for their science projects. Performance marks influenced their science marks in turn.

3.6. Researcher's role

The researcher took over both investigator's and teacher's role in this action research. I investigated the literature, learned the theory, reflected theory to practice and reported practice so that other practitioners could benefit from her practices.

The academic literature provides teachers with the ability to develop more critical and confident views for their practices (Kosnik & Beck, 2000, p.127). While trying to find solutions, the researcher in this study examined practices and benefitted from the literature during the planning and implementing action plan. On the other hand, literature cannot include all problems and their solutions; therefore, the researcher solved some of the problems residing her experiences and reflected them in the report. For example, when few of the groups did not succeed in group work and could not develop their web sites, I decided to assign group leader for those groups so that they could go one step further and negotiate.

As a teacher, the researcher both made them learn web design and guide them for collaborative learning. I taught them basic knowledge about web design in lessons and helped them to manage difficulties of project work by suggesting resources or showing them alternative solutions. I orientated them how to work collaboratively during the study, assessed students' success, and encouraged students to send message through forum. Observation was crucial in order to handle group conflicts, complexity of project-based learning or difficulty to design a web site. In addition to fulfilling these tasks as a teacher, I observed and recorded these observations to collect data as a researcher. I interviewed students and interpreted all those data after understanding.

3.7. Instruments

3.7.1. *Students Interview*

The interview was composed of 15 questions and the questions were generally open-ended questions. It was benefitted from the instruments of Ferrara (1993) during the preparation of the interview questions in *Appendix-A*. After preparing the questions for the interview, the researcher consulted with experts, who are the supervisor and the co-adviser of this research, and instructors from the Faculty of Education at METU, whether the instrument was appropriate or not. Then, the instrument was implemented to one of the students from the sample to explore non-understood words or questions and to find out whether the questions reached their aims or not. Because small changes only were done to the interview, the data collected from the first interview was not canceled. After the researcher reexamined the interview questions, I made the interview with other students one by one. The data were recorded by a tape recorder and the researcher wrote the important points after each interview.

The interview was structured so as to provide equal conditions to students. This was done so to save the reliability of the study due to the fact that age level of the students was low. With the help of interviews, it was tried to reach students' perceptions about technology integrated collaborative science projects through project-based learning method. Students were asked about forum, collaborative group work, motivation components, negative points of collaborative group work, gaining computer and science knowledge, learning from their peers, teachers support, personal development, contribution of collaborative group work to their projects, preferences about collaborative group work, using computer in science and project based learning. After recording the data, the researcher coded the aural data on paper and then analyzed it with content analysis.

3.7.2. *Observation Forms*

Observation forms (*Appendix B*) are composed of 15 items and for each item the researcher marked one of never, sometimes and usually boxes. The items were created with the help of observation forms of Ferrara (1993) and Perry (1999) and they were revised by the supervisor of this study. The observation form items were generally on collaborative learning but the form also included items related with teacher support, project-based learning, and science and technology.

3.7.3. *Forum Archives*

The asynchronous communication tool is designed by Web Wiz Guide for participants to communicate and share knowledge with their friends and especially group mates. This tool, forum, was attached to the school site. All students were given a login name and a password and they learned how to use it before the implementation.

The forum was designed in such a way that enables students to send messages to an individual, to their groups or to all class. They could communicate both with their teachers and with their friends. As they sent messages, post number increased and they had more stars. They could also send documents to their friends.

3.7.4. *Activities / Projects*

Participants completed weekly tasks and showed them to the teacher personally and as a group. At the end of the implementation, each group handed in their web site projects to their Information Technologies teacher. Projects were evaluated with web site evaluation rubric which was composed of 20 items and based on grading according to these items related with the content, view, grammar and design.

3.8. Data collection

3.8.1. *Students Interview*

The researcher made interviews with all 15 students at the end of the implementation in order to understand students' perceptions. The students' answers were recorded with a tape recorder.

Interviews were done in the same place; and before the interviews, the researcher told students that they must not talk about the interview among themselves until all students answered interview questions. The questions were generally open-ended questions; yet when students were asked yes / no questions, they were asked another question to justify the reason or to answer in a more detailed way. When students could not answer, the researcher first repeated the question, then asked the question in other words and then asked it through benefitting from the possible answers for some questions.

3.8.2. *Observation Forms*

The researcher filled out observation forms for each group at the beginning, middle and at the end of the project term. Due to the fact that the researcher has taught them basic computer skills for three years; I have known the students closely. Moreover, I existed at computer laboratory during the breaks, lunch time, and after the lessons (from 2.30 p.m. to 5.00 p.m.) as I was also a teacher trainer of the school. This gave the researcher the opportunity to see how they studied and how they perceived the project work even out of lessons and more rationally.

3.8.3. *Forum Archives*

Messages that students sent through forum were archived in the database. The number of posts they had sent was also recorded. After the implementation, they were analyzed as supporting data for the interview questions related with the forum. Moreover, with the help of forums, the researcher followed students' project work

and collaborative group work during the study. That is, it helped the researcher to recognize inactive members, problems or any deficiencies and so I was able to reach their perceptions.

3.8.4. *Web Site Evaluation Rubric*

The researcher assessed students' weekly tasks both as individuals and as groups. That is, students got two marks (+ or -) for their own tasks and for their group tasks. At the end of the study, students handed in their projects to the teacher and they were evaluated according to web site evaluation rubric (*Appendix-C*) adapted from the web site evaluation form in the Information Technologies 8th level book of the Ministry of Education written by İnce, Şenyüzlü and Uğur (2007).

3.9. Data analysis

The researcher used Content Analysis to analyze the data collected through interviews. Each student was given a number to reflect their answers to the report without giving their names. After investigating the major instrument of the research, which is interviews, observation forms were analyzed to be sure about the information obtained from the interview and to understand it better. Forum archives were also helpful to interpret answers of the participants about usage of forums. Furthermore, web site evaluation rubrics showed the quality of prepared collaborative works and provided the researcher to check whether given information in both messages and interview was reliable or not.

The data were analyzed by using Weft QDA software. In order to implement content analysis, coding technique, which is named as meaningful words, sentences or paragraphs (Yıldırım & Şimşek, 2005), was used. First, the researcher read the answers given in the interview carefully for many times. Then, I found rational codes in the highlight of the research questions by comparing and rereading them. After coding, codes were attached rational themes. Then themes were arranged according

to research questions as summarized in *Appendix G* and they were interpreted with the support of the other data sources.

3.10. Trustworthiness

In order to measure quality and validity of this qualitative research, Guba's criteria were used. According to Guba (1981), in order to maintain the trustworthiness of qualitative studies, the following terms must be taken into consideration: credibility, transferability, dependability and confirmability (as cited in Mills, 2003). Throughout the study, prolong participation, persistent observation, triangulation, collected documents, and detailed descriptive data strategies were used to keep the trustworthiness of the study.

3.10.1. *Prolonged Participation*

The researcher did the research where I have worked for three years as the Information Technologies teacher of the participants for three years. Furthermore, the researcher has been the class teacher of the participants for two years. Therefore, I know the characteristics of students and the context well enough. In addition to these, the research was ended in 10 weeks after providing pre-preparations of the study and the researcher was active participant of the study during this term. In this long term, concepts such as "persistent observation," which is also the credibility issue according to Guba (1981), and "disciplined subjectivity," which comprises researcher's reflection, introspection, and self-monitoring according to McMillan & Schumacher (1997) (as cited in Huss, 2007) were dealt with in order to overcome researcher's bias and distortions.

3.10.2. *Triangulation*

Data triangulation is one of the strategies which are used to enhance qualitative research validity and which enable the researcher to understand the event better (Johnson & Christensen, 2004). In the study, to understand students' perception better, more than one source were applied for each research question as pointed out

in Table 4 so that distortion could be minimized. Triangulation method strengthened credibility, dependability and confirmability of this research.

Table 4 Data Triangulation Matrix

Research Questions	Data Source		
	1	2	3
Q1: perceptions about collaborative work in the computer lessons?	Student Interview	Observation Form	
Q2a: perceptions about project-based learning in computer lessons?	Student Interview	Observation Form	Web site Evaluation Rubric
Q2b: perceptions about using technology to prepare science	Student Interview	Observation Form	
Q2c: perceptions about computer lessons supported with a forum?	Student Interview	Observation Form	Forum Archives

3.10.3. *Collected documents*

According to Mills (2003), all kinds of raw materials such as documents, films, videotapes, audio recordings and artifacts promote credibility of qualitative researches. In addition to students' views obtained from the interview and the teacher's view obtained from the observation form, web sites were also regarded as evidence showing the success of the phenomenon concretely. Furthermore, messages sent through forum were also raw data source for the research and it was beneficial for corroborating the answers related with forum usage given in the interview. Finally, interview records were also concrete data source of this study.

3.10.4. *Detailed descriptive data*

In order to enable other practitioners to benefit from the research findings, the context and the sample should be explained in detail (Meyer, 2000, p. 9). As the researcher has lived through the context for three years, I am knowledgeable about the context and participants, which provides detailed descriptive data for this research. The researcher gave many characteristics about sample and much detailed knowledge about the context. This supports the transferability of the research.

3.10.5. *Other considerations*

Besides Guba's criteria and strategies (as cited in Mills, 2003), there are other items that must be taken into account. In order to provide students with real learning environment, multiple researchers were not included in this research. Students would not have felt comfortable and behaved normally if an extra teacher or an expert had attended to the lessons. Therefore, this would weaken the reliability of the data.

According to Fraenkel and Wallen (2006), participants' being part of the study and being aware of the aim of the study threaten the trustworthiness of action researches. In this research, participants only gave information such as stating their view in the interview, which was at the end of the implementation and they were observed without their knowledge. Therefore, this threat could be avoided.

In spite of the weaknesses those threats can cause, there is one strong side of the study also. The researcher was not alone while planning, implementing, analyzing and interpreting the data. I applied to the views of an expert, who is the supervisor of this study, during the research. Besides the supervisor of the study, there were other experts, who are university instructors, while preparing the interview questions and analyzing the data.

3.11. Assumptions

The study has the following assumptions:

- The participants responded the interview questions accurately,
- The measures in the study were reliable and valid to make accurate results,
- The subjects were literate sufficient for comprehending and responding in all written messages and questions in the interview.

3.12. Limitations

The following limitations resided in the study:

- The results and conclusions are limited to the case investigated,
- Most of the students do not have computers and Internet connections whenever they want; because they do not have computers at their home.

CHAPTER 4

RESULTS

The purpose of the result section is to explore perceptions of students so that it can be concluded how the new practice is enhanced. In order to understand the results, firstly interview questions were examined according to their relations with the research questions supported with the results of web site evaluation rubric, forum archives and observation of the teacher; and then observation forms were analyzed in detail.

4.1. The learners' perceptions about collaborative work in the computer lessons

In order to understand students' perceptions about collaborative learning and fulfill practical need to provide students with learning environments in which they can study in a more collaborative manner, students were observed, interviewed and their projects and messages sent through forum were evaluated. In the highlight of these data sources, participants' experiences about collaborative group work, challenges of collaborative group work and their preferences about collaborative group work are mentioned below.

4.1.1. Learners' perceptions about collaborative group work

In this section, firstly participants' comments on collaborative group work were presented. Difficulties of collaborative group work participants experienced during the project were placed in the second part of the section. Finally, students stated their preferences about collaborative group work or individual work and group size.

4.1.1.1. *General issues about collaborative group work*

The participants believed that all of their group mates did their tasks. Only one participant said that their group mate was late in doing her tasks and they helped her to do her tasks but she did everything she was able to do.

Ten students found their collaborative projects successful. Four of them said that it was successful but it had deficiencies, and one student saw his project as unsuccessful. The web site evaluation forms showed that all groups handed in successful and absolute web site projects with small deficiencies that were negligible. 13 students stated that they could not do the project as good as the group did. 2 students believed they could do better on their own; however, they changed their answers in the following questions of the interview, as one of them stated:

> I could do this project on my own; due to the fact that I selected the subject on my own, I did it myself; in fact, I could have got help even if I had done the project individually in parts when I could not have done.

> If the work were an individual work, I could do; yet, I could feel perturbed as I could think I might not achieve. In group work, we can do a better one by sharing. If I had done on my own, problems again would have been aroused. May be, I could have been as successful as our group, but I am not sure. In fact, I would not want to work with the same people again. We did not have a personal problem among us; but one of them was accusing us with her talking when there was a problem; therefore, I became annoyed [P-7, I-4].

Students commented also on their most significant contribution to the group as shown the frequencies of the answers in the Table 5.

Table 5 Students' most significant contributions to their group works

Student Responses	*N*	*%*
Helping my friends	7	46,66
Doing web design	6	40
Researching	4	26,66
Unifying what was done	1	6,66

While analyzing the responses, students' parts were excluded and group tasks were taken into account. 7 students (46,66%) took help from their group mates. Students helped their friends by telling what their friends could not understand (4 students), supporting their friends (3 students), and reminding what their friends had forgotten (1 student). Two students stated:

> I undertook to teach what my group mates did not know in the group [P-12, I-7].

> To remind, to make recommendations was the most significant contribution of mine. They might have remembered but sometimes they might have forgotten some things; therefore, I reminded them [P-6, I-7].

6 students (40%) thought they played a big role in designing the web site. One of the high achievers said that:

> I created on my own the tables and the consistency between the web pages by copying and pasting in standard pages. May be, my group mates would have not done like that [P-3, I-7].

4 students (26,66%) thought they had a significant contribution in researching part and one student (6,66%) thought that he spent a big effort in unifying their group mates' part.

When students were asked whether they took the decisions as a group or individually, all students stated that they took decisions as a group, and three of them reported as:

> We took the decisions as a group. Sometimes, they said something else against my ideas, and then we selected one of the ideas and eliminated the others [P-4, I-6].

> For example, in selecting suitable pictures, generally, we made brainstorming whether that picture could serve or not by coming together [P-13, I-6].

> We got together, took decisions, and asked everyone what they said about the issue. At other times, we took individual decisions and then asked our friends out of the group to decide which one was the best. S/he selected the best decision and we applied it [P-5, I-6].

Another comment was on the leadership in the groups. All members of the three groups said that there was a leader in their groups. One of the groups selected their leader with the teacher's support on the grounds that the student was doing further parts of his tasks. The leaders of the two groups became the leader automatically as they were spending notably more effort than their group mates. The following comments belong to the members of one of those groups:

> While doing the project, I did not realize but the person putting new ideas or suggestion was generally me. Group tasks were gathered on my computer. Although I was not aware of, I somehow became the organizer. My group mates were asking questions; they wanted something about their own tasks; then suddenly I became the leader of the group [P-3, I-15].

> She became the leader of the group with her success in lessons. That is we did not tell her to be the leader. I did not do anything for this; but later in the preparation of the project, we saved our tasks on her computer to unify them as one project. Then she was the leader [P-13, I-15].

> She was the leader both because she was studying with a great strength of purpose and because she was doing much more than us to make the project better. Therefore, she was the leader [P-15, I-15].

On the other hand, 2 of the 3 members in the other two groups thought that there was no leader while doing their projects. They thought they all spent equal effort in the projects; although 1 of 3 members believed that one of their group members studied more than the others. Amazingly, the group leaders they implied did not see themselves as a group leader.

The participants mentioned about the contribution of collaborative group work to their projects. Only one student thought that collaborative group work did not provide any contribution. On the other hand, while answering other questions in the interview, he changed his answer and stated as:

> More advanced projects can be done by a group than individually. Working as a group made the project better because we had to help each other as we were the members of a group. If I had done the project on my own, the desire to help someone might have been decreased; but I realized that I helped and got help better with a group work and we can do anything by helping each other [P-5, I-3].

All students agreed on the positive contribution of collaborative group work to their project. They gave different answers related with the contributions it provided. The responses are presented in Table 6.

Table 6 Contribution of group work to students' projects

Student Responses	*N*	*%*
Helping each other more	9	60
Learning from each other more	6	40
Doing better	5	33,33
Sharing more	2	13,33
Communicating better	2	13,33
Doing easier	1	6,66

According to 9 participants (60%), collaborative group work provided them with more help than when they did an individual work. One of the participants stressed helping in collaborative group work as:

> For example, when one of my friends might not be able to do something, getting help from his or her group mates provided contribution. If we had studied individually, we might again help each other; but now, it became compulsory and everyone was responsible for their groups [P-3, I-3].

6 students (40%) thought that they learned from each other what they could not understand from the teacher. The following students stated that they learned from each other as:

> My group mates helped me. I have learned what I did not know [P-2, I-3].

> I have learned how I would do. For example, I have learned how I could change the color [P-9, I-3].

5 students (33,33%) believed that they did better projects with collaborative group work. One student stated her reasons as follows:

> If I had prepared the project on my own, may be, I would not be able to do on time; because there were many subtopics. Moreover, my group mates helped me in the points I did not know. Therefore, I think that the project was done better with a group [P-6, I-3].

2 students (13,33%) said that they shared their knowledge more owing to group work. One stated as:

> I have learned sharing with group work. Learning this, I began to get on well much better [P-8, I-3].

Communicating better was another contribution of collaborative group work according to 2 students (13,33%). One agreed on this contribution, stating:

> Although I sometimes had to withdraw a claim, group work had important contributions to communication among friends. Someone can communicate with his friends with the help of group work [P-11, I-3].

One student said that she would have had a difficulty to do the project but they did the project easier with the help of her group mates.

All students thought that collaborative group work contributed also to their personal developments. These contributions of collaborative group work are shown in Table 7 with their frequencies.

Table 7 Contribution of Group work to students' development

Student Responses	*N*	*%*
Knowledge	6	40
Willingness for helping each other	4	26,66
Awareness of responsibility	3	20
Capability of working together	3	20
Capability of sharing	2	13,33
Feeling of self-confidence	2	13,33
Capability of negotiating	1	6,66
Creativity	1	6,66

6 students (40%) thought that they improved their knowledge of both Computer and Science with the help of collaborative group work. One participant said:

> I have reinforced my knowledge. If we had not done that project, I might have been losing my knowledge. May be, I will recall this knowledge even when I am grown up; we confronted many difficulties together with my friends while doing that project. That is, group work was very beneficial for me [P-6, I-7].

4 students (26,66%) believed that collaborative group work increased their willingness for helping each other. Some of the participants stated that:

> Group work was beneficial for me in terms of helping each other. We asked what we did not know to our group mates without hesitating [P-14, I-7].

> If I had done this project on my own, the desire of helping might have decreased; however, due to help in the group work and my assist to my group mates, I now see that helping is better and we can do everything by helping each other [P-5, I-7].

3 students (20%) said that they felt more responsible while doing collaborative group work because his success would affect their group mates' success. One of them stated the reason of his feeling as follows:

> When we studied as an individual, one of my group mates was interested in her own task; therefore, she did not help us very much. However now, we study more collaboratively due to group work. We would get a common mark; thus one of deficiency in the tasks of the members of our group would affect all of us. As a result, she helped us more [P-15, I-7].

2 students (13,33%) stated that they learned working collaboratively by doing this project as a group. One participant stated that:

> Group work helped me to develop the tenacity of working together. Normally, when homework is given, I do not think of studying as a group; but I want to do group work very much after this project. In addition, when we worked as a group, the result became better than an individual work owing to the fact that I made use of my group mates' ideas and they helped me where I could not [P-10, I-7].

The capability of sharing was another contribution according to 2 students (13,33%). They believed that collaborative group work provided them to share their ideas and knowledge more with their friends. One of the participants reported as:

> Group work helped me to think more positive about sharing. That is, I reached to the high level of sharing with the help of group work [P-8, I-7].

1 student (6,66%) thought that collaborative group work developed his ability to get on well with his friends.

According to 1 student (6,66%), collaborative group work helped her to think more creative.

6 participants (40%) stated that collaborative group work motivated them to work harder. These students comment on motivation issue of collaborative group work as follows:

> If had done the project on my own, I would not be motivated that much. I collected useful information and so did my peers. When I saw how they were appropriate for the project, I wanted to study more and so did my group mates [P-8, I-10].

> My group mates pushed me to work. They said, let's do this, let's do that and I said okey. When we could not do something, some of us said how to do and we did it. So, I studied more with the help of my group mates [P-14, I-10].

One of the participants specified that they wanted to do collaborative project work especially as a group when they were asked whether they wanted to do collaborative project work again. She commented as:

> I want to do it especially with a group. I like group working because when we do a project as a group, I study more efficiently. If I had studied on my own in this project, I would have felt stressed when my friends' projects were finished. I could not have done better than I can now and I could have been efficient. I was more relaxed when she was with us. She made us to feel better when we could not do something and helped us [P-15, I-14].

Two of the participants (13,33%) did not want to do the project work due to its difficulties but wanted to join in group work. On the other hand, 2 of them wanted to do it but wanted to change their group mates. They stated:

> I want to do collaborative project work but I want to change my group mates this time as I want to work with different people. It was enjoyable and provided good time. I learned many things and I enjoyed it at the same time. I want to do the same again so that I share my experience and knowledge more [P-8, I-14].

> I want to do collaborative group project but not with him. He prevented us from working efficiently [P-12, I-10].

4.1.1.2. *Challenges of collaborative group work*

In the interview, the participants brought to the surface the difficulties they came across while doing collaborative group work demonstrated as in the Table 8.

Table 8 Challenges of collaborative group work

Student Responses	*N*	*%*
Negotiating	7	46,66
Gathering the group mates	4	26,66
Working together	3	20
No problem	3	20

7 students (46,66%) had difficulty coming to an agreement in a group. Their disagreement sometimes caused a big delay as stated below:

> One of my group mates said that I needed to add tables to my web pages and the other said I did not. One of them said that the heading had to be colorful; the other said it had to be plain. There existed that kind of troubles. At the end, we reached an agreement. For example, we said to our group mate to add tables to his web pages. He did not add until the teacher told him to add and it took a long time. [P-12, I-3].

On the other hand, most of the groups coped with the problems before long as one of the participants stated:

> While doing group work, sometimes there existed problems; for example, when determining the color of the background, while I wanted the color green as the background, they wanted something else. That kind of a problem aroused; but we found a color all of us would want [P-6, I-3].

Gathering group mates was another problem that 4 students (26,66%) encountered. Some of the participants commented on this problem as:

> In the group work, sometimes one of my group mates studied as we planned while the others did not; i.e. he did not come to the group meeting. We had such kind of problems. Continuously, the free time of one of us did not suit to the others' [P-8, I-3].

> Lessons were only one hour; therefore, we could not meet as a group. It was better if we could have come together more. We could discuss out of lessons, i.e. in the breaks as we were in the same class with my group mates; but we could not meet out of the school very much.
>
> We came together during the breaks and the Information Technologies lessons; however, we could not get together at lunch time because my group mates went home for lunch.
>
> Sometimes two of us came together. Sometimes all of us appeared in the group meeting [P-11, I-3].

> When we entered the Information Technologies class, other students used the computers to do homework; therefore, we sometimes could not do our project and got panic [P-15, I-3].

It was recorded that 3 students (20%) had difficulty working together as they stated in their interviews. Their group mates did not show as much care as they did or they did not feel as the member of a group. Therefore, the collaborative group work did not reach its goals sometimes. They also stated that those difficulties happened sometimes and the problems were solved without taking long time. One of the participants claimed:

> My group mates did not help me at the beginning of the project work; they started to help me later. When they did not help me, I had difficulties developing the project. When I told them I would inform the teacher about this, they started to study and help me [P-9, I-3].

3 students (20%) stated that they did not have any problem while working as a group. All students indicated that they did not have any problem in sharing the subtopics of

their project subject. Only one student said that their group mates selected the same topic. Then, they solved the problem by casting of lots for it.

8 students (53,33%) thought that their desire to study decreased due to collaborative group work. They were annoyed with the disagreements in their group and when there existed such a situation, their motivation decreased. However when the problems were solved, they again went on to study as one of them stated:

> First of all, I did not give up even when there were disagreements in the group but I sometimes thought that nobody would use our web site, so I could not motivate myself, and had difficulty explaining why we needed to do such a project. However, I saw how useful it was when we finished the project and everything was better at the end of the project.

Collaborative group work was among the reasons why students had difficulty in doing the project or why they did not enjoy doing the project sometimes. 2 of the 5 participants stated:

> I had difficulties sometimes while communicating with others one by one.

> My group mates sometimes did not help me and I had difficulties then. They were interested in something else such as preparing slide shows for the teacher and I was annoyed.

4.1.1.3. *Students' preferences about collaborative group work*

12 students (80%) preferred doing such a project with a group because of the possibility of getting help and learning from each other. One of the participants commented on why she wanted to do collaborative group work as:

> I wanted to do group work because I found the teacher whenever I wanted and then when I called my group mate, she came to help. They would not have come for help whenever I called if we had not done group work. Moreover, I could not have done this project on my own [P-1, I-7].

3 students (20%) pointed out that they wanted to do it both as an individual and as a group. One of them stated her reasons as follows:

> If the subject of the project were the same, I might not get the project done on my own because our unit was very comprehensive. On the other hand, I would have taken quick decisions; for example, if I had selected pink for the subject part, I would not have waited for my friends' choice. I could have changed whenever I wanted and if I had not done well, I would have got minus on my own; but now, if I wanted to change the color and could not get the project done, my group mates would also get minus because of me [P-3, I-7].

One of the students stated at the beginning of the interview that she wanted to do the project individually. Nonetheless, when the researcher asked the student whether she wanted group or individual project if her group mates were replaced with more successful students, she preferred collaborative group work, thinking that she could get more help. It is understood that she wanted to do the project individually at first because she did not work collaboratively with her low-achiever group mates. After the researcher realized that, the following dialogue was recorded:

> If my group mates had not been low-achievers, I would not have trusted myself probably as much as I do now. I thought it might have contributed to my learning. If I had worked with one of high-achievers in our class, she or he would have done everything in the project and I could not have learned so much [P-9, I-7].

Therefore, it is safe to say that nobody preferred to do the project individually.

Students also mentioned about the optimum number of members in their groups. 11 students (73,33%) thought that a group consisting of three members was appropriate for an efficient collaborative group work. On the other hand, according to two students, if their groups had consisted of two members, they could have communicated and negotiated more easily. From the other point of view, another 2 students (13,33%) believed that they could study with 4 group mates more efficiently. 2 participants (13,33%) who argued that there must be 4 people in their groups claimed as follows:

> There should have been four students in the groups because four students could help each other more efficiently; one of them would help me while the other would help my group mate (P1) when we were not able to. Therefore, even number would be better; there should not have been two people because it is not enough. If we had done this project as a group composed of two students, we would have formed a group with my group mate (P1) but we could not have done such a project with her; therefore, a group with two people is inadequate [P-2, I-8].

> Four students would have been better because one of our friends from another group could have cope with one of my group mates [who spoiled the group work]. If he had been in our group, four students would have communicated better [P-12, I-8].

4.1.2. The learners' perceptions about peer support

Students were asked whether they could get help from their group mates and all of them stated that they got help more or less. Some of the participants commented as follows:

> I asked, for example, how to change the background color to my group mate. I did not know how to add a table, or how to make visible drawing tool bar and I asked all these to both of my group mates [P-12, I-3].

> I got help from my group mates. I asked one of them, for example, how to put my pages to the template page. I could not understand this much in the lesson and he told me how it be done and we did it together. First, he did one page and then I went on [P-8, I-3].

> I got help from my group mates. For example, I could not add animation to my web page and wanted help from the teacher. You said that you would come a few minutes later. At that point, I realized that one of my group mates could add animation to her page. Then I asked her to teach me how to do it and she helped me. My other group mate also helped me. I have learned many things from her, particularly when I could not catch up with in the class. That is, I asked them some things [P-3, I-3].

When they were asked whether they gave assistance to someone out of their group or whether someone out of their group was of help to them, 3 students (20%) said that they did not cooperate with other members out of their group.

All of the students said that they held meetings to work with their group mates. According to the students, they worked together in the breaks, in the lunch time, and after the lessons. Most of them met in the computer laboratory; on the other hand, members of some groups got together at their home even rarely. To express how they came together and worked, some participants stated:

> We sometimes came together at school. Sometimes my group mates came to our house at weekends. We wrote the content of our project on paper to reflect them on computer later [P-9, I-5].

> Our lessons took only one hour; therefore, we could not meet so much. As a result, all ideas in the group could not been realized as the project finished on time. If we had come together more frequently, it would have been better. We were able to discuss as we were all together in the same class. We met in computer laboratory in many breaks and Information Technologies lessons. We could not come together in lunch breaks so much as my group mates went home for lunch. The only member having lunch at school was me. Although all three of us did not come together, sometimes at least two of us worked together at lunch in the computer laboratory [P-11, I-5].

> Yes, we did. Every morning, I was drawing the tables at home. Then, I told my group mates how we did it and they were doing; and they notified me when they could not do [P-3, I-5].

> We came together in the breaks. We were planning and studying better with one of my group mates as she was my best friend and we were together all the time [P-15, I-5].

> We came together in the computer laboratory to work collaboratively at school. All three of us could get together rarely as we do not live in the same village and one of our group mates was hall monitor at school. Therefore, not all of us but two of us could come together. Sometimes, all of us worked together [P-12, I-5].

11 students (73,33%) said that they shared resources they had found with their group mates. Most of them really shared resources with their group mates and they used them to do their tasks as the following students explained:

> Yes, we did. For example, I found different things related with the Science subject, electron permutation which was the subject of my group mate. She was looking for that subject and I found it and shared with her. In fact, all of us were interested in all topics without thinking that topic was not under my responsibility [P-3, I-5].

> Yes, we shared. For example, one of my group mates found out a web site which included my topic. She gave me the address and I used it [P-4, I-5].

> Yes, of course, we shared. For example, one of my group mates was looking for a picture for his topic. I found some pictures and shared with my group mates. We thought some pictures were not appropriate but he used some of them [P-6, I-5].

One of the students took an address from his group mate but did not share so much. According to the example he gave, his group mate recommended him a resource; but he did not use the source as his comments stated below:

> One of my group mates gave me an address of a web site. I looked at the web site and decided that it was not suitable for 7^{th} grade students [P-5, I-5].

4 of the students (26,66%) claimed that they did not let anybody to know the source they found appropriate for their project as one of the students stated:

> We did not share any resources. Everyone found the resources related with her own topics. We did not give any address or any other thing to each other [P-2, I-5].

One of the 4 students did not share the source but she contributed her group mates' part with her own source. Her statement was as follows:

> We did share any resource. I did not give them the name of the resource but I contribute to their topics. For example, I put pictures related with our group mates' topics in pictures part [P-9, I-5].

4.2. The learner's perception about teacher support

All of the students thought that they got support from their Information Technologies teacher. Some of the students stated that their Science and Technology teacher also supported them during the project-based learning. 4 students stated that they were not supported by the Science and Technology teacher. The students specified different issues that they got help from their teachers as can be seen in Table 9.

Table 9 Themes for Teacher support

Student Responses	*N*	*%*
Support for web design	7	46,66
Support for content	7	46,66
Support for visual elements	4	26,66
Support for resources	4	26,66
Support for basic skills	1	6,66

7 students (46,66%) said that they wanted help for web design from the teacher. One participant stated:

> I have learned how to create a web page from you. I mean while designing our index page, I wanted you to take a look at whether it was good or bad [P-9, I-12].

7 students (46,66%) thought that their teachers supported them while preparing the content of the project. One of them expressed his opinions as:

> I also took help from our Science and Technology teacher. For example, once I had made the content of my web page without paying necessary attention, he told me he thought I could do better and wanted me to erase and do it from the beginning [P-5, I-12].

According to 4 students (26,66%), the teachers were helpful for them in enriching the project visually as one of the students stated:

> I designed my web page as there were both text and sound link. The links were side by side. Our Science en Technology teacher could not understand that it was required to click both of the links to read and listen at the same time; therefore, he recommended me to change it [P-9, I-12].

4 students (26,66%) got their teachers' assistance to find an appropriate resource for their project. The following student reported how they got help from their teachers while looking for a resource:

> At first, we found out resources related with our subject from the Internet. By then, our Science and Technology teacher lent a hand to us and gave us a web site address; we did not use it later, though [P-15, I-12].

1 student (6,66%) said that she only got help technically such as how to copy and paste.

4 students (26,66%) said that they did not get help from the Science and Technology teacher. The others received help in getting resources, particularly about content and visual components.

4.3. The learners' perceptions about developing web pages on science subjects in the project-based learning environment

In this section, the students' answers given in the interview were examined in order to find alternative ways to provide them with better interdisciplinary projects based on learning environments.

4.3.1. The learners' perceptions about project-based learning in computer lessons

When the students finished the project, 9 students had positive feelings about their studies, stating that they felt good, happy, self-confident and proud because they

were pleased with the project they created. Some of 9 students explained their feelings as:

> I feel good because I think it is well-done and I believe it will contribute to my life. May be, I will create my personal web page after this web site project. It was a very good project. It was better for me as it helped decrease my exhaustion in terms of lessons. When we were busy with the lessons especially related with SBS, I was relaxed doing web site [P-11, I-7].

> I started to trust myself when I finished the project. I realized that I could do better ones. This was not very difficult. There are more difficult projects and we could do them.
>
> Our project was very good. We spent effort and at the end we created a successful project. I felt good [P-4, I-7].

> I felt proud and I realized that group work was more efficient than an individual work due to studying together with my friends in a group work; on the other hand, in an individual work, I would spend more time for studying and it was more tiring [P-8, I-7].

4 of the students had both positive and negative feelings. They stated their reasons both for their positive and negative feelings as:

> I felt very good when I finished the project because the project was done successfully in the end without facing any difficulties and we got rid of it. I think the project was good; therefore, I feel pleased only because we have done this project without needing help from anybody; we have done.
>
> The reason that I felt bad is disagreement between me and my group mates, especially one of them. If it had not been for the project I would have never experienced this [P-6, I-7].

> I felt good as I have learned many good things while doing this project. I have learned to respect for my friends' choices and many other things…
>
> Sometimes I did mistakes; sometimes I did the right things. The project was a good deal. Some parts of the project may be insufficient [P-1, I-7].

> I felt happy when I finished the project. I got rid of dealing with the project. That is, I relaxed. In fact, if I had finished earlier, it would be

> better because I want to do many things related with the project now. If I had finished the project earlier, I could have done small adjustments comfortably; but now, I am pressed for time for the project. However, if I had completed a better project, I would have felt more relaxed [P-3, I-7].

> We worked hard for three or four months for this project; therefore, I felt relaxed when finishing the project. At the same time, I felt bad as there were insufficient points in the project and one of my group mates had to work alone. I felt sad as I could not help him [P-5, I-7].

Two students stated negative sentences about their feelings in comparison with their friends and they explained their feelings as:

> I felt a bit unhappy when I finished the project because I was afraid as if there would arouse a problem. We encountered many difficulties; therefore, even when the project was finished, I felt that we would again encounter a problem [P-7, I-7].

> I felt bad when I finished the project. When the project was almost finished, one of my group mates did not know to add a table. He caused many troubles [P-12, I-7].

13 students imparted in a positive manner about carrying out the project-based learning in the Information Technologies lesson. 4 students thought that it was pleasing to take part in a long term project as there was plenty of time to ask for help from their friends and teachers. Two students said that they came to trust themselves in using computer with the help of project work. Two of the students affirmed that they learned more by this way. Another two declared that they learned better. One of the students said he learned in a more permanent way through the project. One student said that they could not attend a competition with homework and another one declared his satisfaction as he thought other students would benefit from their project. Below are how some of 13 students expressed their positive attitude toward project-based learning:

> It was good. We could ask for help from our teachers and friends. Before this project, we would ask for our teachers' assistance but not as much as we do now [P-1, I-7].

> Preparing the project enabled us to develop ourselves because we did not know anything about web site designing and now we can do. We carried out the project work in a longer period of time and this gave us a chance to be self-confident because it provided us to understand the subject more deeply and develop more successful projects [P-4, I-7].

> Preparing project work in Information Technologies lesson was good. First of all, I started to feel more self-confidence. If I had not done this project, I would not trust myself. I had self-confidence in both designing web site and using computer. I did not use to take homework which must be done on computer because I did not trust myself. Now I am taking them and my homework become satisfactory. It is related with this project. We used computer all the time while doing this project. I did not know many things before preparing this project. I was afraid of taking homework which must be done on computer as I was not able to cope with if I came across points I did not know. Now, it is better [P-6, I-7].

> We first of all learned computer and then a new program; and the subjects of the content of the project affected our Science lesson. In the term project work, we put effort more on the program and learned it in detail; but in our previous lessons, we did not work with the program as hard as we do now [P-8, I-7].

> The project we have done is beneficial for me and for other 7th-grade students because they can search from our web site. Our project is better than any homework as homework would be pointless for other students. Moreover, I repeated things I learned in Science lesson and I will benefit from this in SBS exam. When we prepare homework, it is usually less permanent than a term project because homework is finished in a short period of time and it is forgotten [P-10, I-7].

One student argued that it had positive and negative sides, stating her reasons for the positive and negative sides of the project work as thus:

> It was good to prepare a project in Information Technologies lesson but it was a bit tiring. The reason for this is that we did this project with computer and the Internet and I did not have Internet connection at home; therefore, it was difficult. I could come to the computer laboratory only in the breaks and not only I used the computer in the laboratory but there were also other students using computers in my free time; as a result of this, there was time problem. It was more

> tiring when I struggled with them to find a seat and do the project [P-3, I-7].

Another student stated that he did not want to do such a study again, declaring the reasons for this as:

> The project work must be given if the student wants to do it. I did not want to do it anymore as we were forced with my friends very much [P-12, I-7].

When students were asked whether the project they had prepared was a usable resource for 7th grade students, all students stated that they found it usable for different reasons. Some of them stated their reasons as follows:

> They should use our web site as a resource. In our project, the content of the web pages were not composed of long texts. We divided subjects into small topics and formed pages for each topic so that users do not have to read a long text to find out information about a small part of our subject. Our project is pleasing in terms of visual perspective. For example, I put a picture that our Science teacher had selected which was very beautiful and rational to the topic. As a result, they can use our web site. For example, if they look for the usage areas of elements, they will be lucky [P-3, I-9].

> I think they can use our web site. When you look at the Pulley page, it has pictures, good content and formulas; therefore, I think they can benefit from our web site [P-6, I-9].

> Yes, it is used because our web site includes three separate subjects which are among the most important subjects in Science and Technology lesson; therefore, our web site can be useful. Some of our web pages are long and some of them are compact, logical and enjoyable with the help of beautiful pictures. To make our web site more entertaining, we will add videos [P-8, I-9].

In addition to these questions related directly with project based learning, some of the students' comments on why doing the project was pleasing were also related with project-based learning. 3 of them stated that they found out how successful projects

they could create and 2 of them said that somebody else would use and benefit from their project.

Two students reported that creating project somebody else would benefit from motivated them. 3 of them found the project work enjoyable and this motivated them to study hard. On the other hand, it was reported by one that the thought that no one would use their web site diminished one student's desire of study, and busy study conditions were forced them and they sometimes did not want to study.

The students were asked whether they wanted to prepare collaborative project work and to explain their reasons. 8 of the students gave reasons related with project-based learning. They affirmed their willingness to do it again because of different reasons as such: they could take more support with a long period; it was enjoyable to make a big project studying in a structured way; their project would be used later; they had learned many things both about computer and science; they had learned computer better; and they knew that they could achieve. 5 of them declared their positive point of view and commented as:

> I want to prepare collaborative project work. For example, you gave us "Five Senses" and we searched it. We made a plan and went on a structured path to prepare the project. When we started to learn the same subject in Science lesson, we can answer some of the questions by means of the project [P-14, I-7].

> I want to as the project is beneficial both for me and for others. With the help of the project, both I learned the subject in detail and the others get information using our web site [P-10, I-7].

> I want to because it enabled us to learn computer better [P-4, I-7].

> I want to. I went on developing our project for a long time and it was controlled each week. Before this, you did and handed in a week. Besides, you are not supported by teachers and friends as much as we are now [P-3, I-7].

> I want to because I think it will be easy. I used to do with difficulty at the beginning but day after day, it became easier because I began to learn it. Another reason why I want to do project work is learning new things. We learned more in a long period of time. Moreover, we obtained one complete project through project based learning. Before this, we used to have small homework and I think if we had not learned all of these subjects through project based learning, it would take longer [P-9, I-7].

> I wanted to because I have learned many things that made my life easy and I have learned much more. It provided me with the ability to make such things better than before and to create more in less time. If we had not done the project work, we could not have learned so many things in this limited time. We have done much small homework before but they have not been used. By producing one project from all we learned in one term, we created a usable project [P-11, I-7].

3 of them put forward the negative points about the project work as such:

> Sometimes I wish I had not attended such a project but after finishing the project, I saw it was worthy. I want to do but I do not want so much difficulty [P-6, I-7].

> I did not want to do it as I had too much difficulty while doing the project [P-1, I-7].

> I do not want to do the term project but I want to do group project [P-2, I-7].

4.3.2. The learners' perceptions about using technology to prepare a science project

14 of the students thought that using computer made their project better while one of them said that it had no contribution, stating the reason that they could use encyclopedia, books or journals instead of computers. On the other hand, the contribution of computers according to 14 students can be seen in Table 10.

Table 10 Summary of computer usage in science project

Student Responses	*N*	*%*
Search on the Internet	11	73,33
Visual elements	9	60
Documentation	4	26,66
Interactivity	4	26,66
High motivation	2	13,33
Easiness	2	13,33
Communication through forum	1	6,66
High accessibility	1	6,66

3 of them found it beneficial to search on the Internet as the following students put forward:

> It was faster to find out sources. When I changed even one letter in key words of my research, I could get different resources so I could examine many resources for my project. I could compare the resources and discover which resources were suitable for 7th grade students and which ones were not. Therefore, it was beneficial for our project [P-3, I-11].

> To search on the Internet provide us with extra time. We found suitable resources for our project faster. We could find out information from books but it was very difficult [P-4, I-11].

> We also developed our search capability due to the fact that we made our research form many sites and created the content of our project according to the information we got from all those sites. I think searching on the Internet is better as we are accustomed to using computer and we can find appropriate resources from the Internet. To find out appropriate information from books is a bit difficult and needs too much researching. Moreover, we could find out more resources from the Internet; and finally there are videos that enable us to learn better and motivate us [P-11, I-11].

The participants also mentioned that their project had rich visual elements with the help of computer and the Internet. Two of them claimed:

> When we do the projects without computer, we draw the picture or cut them from the books and paste them to the papers. I think it is not as beautiful as the project done with computer [P-9, I-11].

> We have the possibility not to find appropriate picture form books or we have to cut them form books; however, whenever I tried to find a picture about Science and Technology on computer, I could find [P-3, I-11].

The interviewees thought that computer was also beneficial in the documentation of their project. Two students commented as:

> I could correct a mistake on computer. Also, I could add a table and colorful headings; however, I could not do them on paper. I may tear the paper while trying to delete a letter and I have to do it from the beginning. Finally, I can write on computer faster [P-12, I-11].

> Our handwritings are not legible; therefore, our projects have not been beautiful and readable. Moreover, we wrote on computer faster [P-8, I-11].

Interactivity made their Science project better according to some participants as they asserted below:

> When we clicked on a topic, the web page related with that topic appeared in the screen in our project. We could not do this on paper [P-4, I-11].

> In computer, we divided our subject into small parts and put them into separate web pages. It was more complex when we put all topics in one part. Students again could have benefitted from that project but they may get confused [P-6, I-11].

Two of the participants considered that their motivations were increased while studying with computer. They stated:

> It would not have been as enjoyable as our project if we had not done the project with computer [P-8, I-11].

> If we had done it on paper, our desire of reading would have decreased [P-15, I-11].

One student believed that it is easier to study the subject from the computer than from the book. One of them said that if they had done the same project without computer, they would have experienced difficulty doing the project as beautiful as the one done with computer in terms of appearance.

One student said that he got help from his teachers through forum using computer and the Internet. One of the participant claimed that with the help of computer, they could publish the project on the Internet and many 7^{th} grade students could use it from anywhere.

All of the students thought that the project had a contribution to their learning of science subjects. The students learned the project subjects of some of the other groups before the projects were finished; however, they did not have the chance to learn the project subjects of some of the groups when the projects were finished as they were the second term subjects and projects were finished in the first term. Therefore, the students from the groups whose project subjects were not taught in Science and Technology lessons in the first term were also asked whether they could tell the subject when they started to learn it in the Science and Technology lesson. The Table 11 divides answers of the students into two in terms of whether their subjects have learned or not and shows us students' answers:

Table 11 Summary of answers about science learning

Responses of students whose subjects have been learned in Science and Technology lesson in the 1st term	*N*	*%*	*Responses of students whose subjects were going to be learned in Science and Technology lesson in the 2nd term*	*N*	*%*
I have learned more permanently	3	20	I can tell	4	26,66
I have learned in detail	3	20	I can tell little	1	6,66
			I have learned but I cannot tell	3	20
			No answer	1	6,66

All of the 6 students whose subjects were taught in Science and Technology lesson before they were finished with their projects thought that they reinforced their learning by doing this project. Two of them stated that their learning became permanent and they have learned in detail as quoted below:

> I think it has contributed. We have learned it in Science and Technology lesson and I repeated it at home; however, again I would have forgotten. But now, I created a project about this subject with my friends, I think it will enable me to recall the knowledge [P-6, I-13].

> Due to the fact that we reread the content of the project after finishing it, I understood the subject in detail and better. I again used to make explanations about the subject but not as much as now [P-11, I-13].

One of the participants whose subjects were going to be learned after they finished their projects and who stated that they could tell the subject to their friends before they learned it expressed that:

> We have not learned this subject in Science and Technology lesson yet; but I have known many things about it. While writing the content and questions of the project on computer, I have learned them and can remember when I see them on the level-determination exam. Furthermore, when we come to our subject in Science and

> Technology lesson, I can answer in more detail when a question is asked [P-3, I-13].

3 of the participants stated that they also enjoyed learning about science subjects in Information Technologies lessons when they were asked about their reasons why they thought doing the project was good. Two of them were pleased to learn many things from multiple perspectives including science subjects. One of them said that:

> The project was pleasurable. I have learned using forum, FrontPage, Excretion System and computer [P-8, I-7].

4 students said that working on a science subject motivated them to work harder. One of the four participants stated this factor as:

> I liked the subject, systems in our body, and this increased my desire to study [P-8, I-10].

As the answer to the question whether they wanted to prepare collaborative project work with its reason, one of the students said that she did not want to do; but when she remembered her learning about Science and Technology, she changed her answer as stated below:

> I did not want to do it again because we had many problems. In fact, I want as I like Science and Technology and we have learned many things from computer and from our friends. I said I did not want to do at first since we disputed with each other in the group and I had difficult times; in spite of all this, I want to do as we again can overcome difficulties [P-7, I-14].

4.3.3. The Learners' Perceptions about Forum

According to the interview, 10 students used forum while doing the project during ten weeks. Students who used forum stated different reasons for their usage of forum as showed in Table 12.

Table 4 Summary of answers about the usage area of forums

Student Responses	**N**
To communicate with their friends	7
To communicate with their teachers	4
To send message to the forum	2
To get information about the project	2

According to the answers, 7 students used forum to communicate with their friends in order to ask something, to make a meeting plan, to help each other, to get information, to share their ideas, to let their friends know their parts and to discuss what must be done. The following comments belong to the students using forum to communicate due to different reasons:

> When it was needed, for example, when we would design certain web pages of our project, I wrote "let's come and do tomorrow" [P-8, I-1].

> I used forum only to share my thoughts when I could not see them [the group members] [P-11, I-1].

> I sent posts, for example to tell my group mate that I did my tasks completely. I sent them through forum so they could see them from their own computers [P-2, I-1].

4 of the students stated that they used the forum to communicate with their teachers. One of them stated her reason as:

> You [the teacher] helped us if our project had an inadequacy with your messages through forum [P-15, I-1].

2 of the students used forum for sending messages as their answers in the following quotation exemplify:

> I sent post to increase post number and the number of star [P-3, I-1].

> For aught I know all my friends were sending messages to the forum and I wanted to send too because that was the first time I sent post [P-13, I-1].

2 of the students stated that they used the forum but not very much because they could communicate each other without the forum and they did not need to use it as they stated. 3 of them claimed that they did not use the forum and they pointed out their reason for not using it stating that they did not need to use the forum as they were communicating face to face with their friends; besides, they did not have time.

8 of 10 students who used the forum while doing the project thought that it contributed to their project. They gave reasons why it contributed as in Table 13.

Table 13 Summary of answers about the contribution of forum usage

Student Responses	**N**
To communicate with their friends	8
My friends helped me	
I sent my documents to show my friends	
I benefitted from the sources my friends sent	
I got in touch through the forum to make a meeting plan	
We discussed how to do the website	
To communicate with their teachers	7
Teachers helped me	
I asked questions	
I sent my documents to show to the teachers	
I learned from the writings of the teachers	
It did not contribute	2

8 students found forum beneficial due to the fact that they thought they could communicate with their friends in order to get help, to show parts they had done, to benefit from the sources their friends sent and to communicate for a meeting and discuss about the project. Below are some of the comments of the students who benefitted from the forum through communicating with their friends:

> For example, ten questions were going to be prepared. I wrote a message to the forum about this because I did not know whether those questions were in the appropriate level or not, and then I learned the answer with the help of my friends through the forum [P-8, I-2].

> We created a web page where we put riddles and crosswords. There was a crossword about Science in the forum and we benefit from it. For example, one of my friends sent intelligence test questions. We will add ones related with our subject [P-10, I-2].

> For example, I did not know how the page would be done. I have learned how it would be with the help of my friends through the messages they sent. They helped me both through the forum and face to face communication [P-9, I-2].

7 students benefitted from the tool by communicating with their teachers through it. They stated that they used it to get help from their teachers, to ask questions, to show documents they had prepared and to get information from the teachers. Some of them stated as follows:

> It was important for me to use the forum. It provided the opportunity for both the teacher and my friends to see things I had done. If only my friends had seen them, you [the teacher] would not have known what we were doing [P-11, I-2].

> We asked our teachers various questions and they answered through the forum, thus we could reach them whenever we wanted [P-15, I-2].

While 14 students found the asynchronous communication tool beneficial for their work, one of 14 students and the other student left indicated that the forum did not contribute to their work. One of the students thought that the forum did not have any contribution to their project; on the other hand, the other student claimed that to communicate with her friends through the forum did not contribute to their work as their reports quoted below:

> Yes, it did because I would ask questions, for example, on Fridays and generally you were absent. I asked my question on that day

> through the forum and I got the answer later. This made my work easier.
>
> We did not communicate with my group mates through the forum because we were already using the same bus going home. Moreover, they did not log on to the forum. I told them directly what I wanted to say instead of the forum [P-3, I-2].

Although 10 students said that they used the forum during the project, when the question was altered some of them changed their answers also. This was in accordance with the forum records also. 2 students admitted that they used the forum to the end of the project. One said that:

> Yes, we communicated to the end of the project [P-2, I-5].

Although this student claimed in that way, she did not write and log on to the forum so much according to the forum records. It is seen that she posted only two messages to the forum during the project.

The other student who had the highest number (90 posts) of messages in the forum and whose last log was on the last project days said the following:

> I communicated both with the members of our group and with my other friends also. When my group mate and I could not know anything, I asked her (the other student in his group) [P-10, I-5].

He wrote 29 messages related with their project. He wrote these messages until the 3rd period of the project work. After the second period, his messages became irrelevant to the subject.

5 of the students said that they did not use the forum from the beginning to the end of the project. Although 2 of these 5 students were among the first three students in the class in terms of the number of messages sent through the forum, they said that they did not use forum very much and commented as follows:

> In fact, I did not know how to send messages to a specific person. One of my group mates log on to the forum very little so I could not write to her. The other was logging on but I was writing messages,

> for example, to the group folder; she was reading messages in the announcement folder; therefore, I was writing to her but she did not see my messages. I did not bother myself by thinking whether the members of my group were in the forum and could see the messages as she would not see the message where I sent it [P-3, I-5].

> We did not communicate with each other through the forum when it came to designing web pages because we were already in the same class… Before that time, we did not communicate very much but we communicated somehow [P-11, I-5].

The student who was at the top in terms of sending messages through the forum among the five students sent 74 messages. 60 of these messages were about their project work. She rarely wrote messages to increase the post number. The student ranking after her sent 38 messages and 15 of them were about their project work and the quality of these messages was pleasing.

8 of the students said that they did not use the forum to communicate. When the forum records were analyzed and investigated the answers of the three questions of the interview related with the forum, the first three students (as can be seen Table 14) who had sent the highest number of messages among 8 students said:

Table 14 Post numbers of students according to their answers about forum usage

Student Responses	**Post Number**
Students who claimed they used the forum during the project	
P-10	90
Students who claimed they did not use the forum from the beginning to the end of the project	
P-3	74
P-11	38
P-15	10
P-1	5
P-2	2

Table 14 (continued)

Students who claimed they did not use the forum at all	
P-9	38
P-8	10
P-7	10
P-5	9
P-4	4
P-12	4
P-13	4
P-6	2

The student with the highest number of messages at first said that she used the forum to help each other, but then she pointed out that the forum did not contribute to their work and she did not use it any more to communicate although she had sent 38 posts to the forum. 27 of 38 messages were related with the project work**.**

The second and third students ranking after her in terms of the number of messages sent said that she did not use the forum and she had sent 10 posts to the forum. When we examined the quality of their messages, one of the students' 5 of 10 messages (50%) and the other's 8 of 10 messages (80%) were related with the project.

4.4. Results from group observation forms

Table 15 Observation form results

Related Themes	Item No	Period 1					Period 2					Period 3				
		Bacacılar	Turkuaz	Menekşe	Gül	Boyacılar	Bacacılar	Turkuaz	Menekşe	Gül	Boyacılar	Bacacılar	Turkuaz	Menekşe	Gül	Boyacılar
General issues about teamwork	1	3	2	2	2	2	2	3	3	2	2	3	3	2	3	3
	2	3	2	3	3	2	3	3	2	2	2	3	3	2	3	3
	3	3	2	2	2	3	2	3	2	2	2	3	3	2	3	3

Table 15 (continued)

General issues about teamwork	4	3	2	2	3	1	3	3	3	3	2	3	3	2	3	3
	5	3	3	3	2	2	3	3	3	2	2	3	3	3	3	3
	6	2	2	2	2	2	3	3	3	2	1	3	3	3	3	3
	7	2	2	2	2	2	2	3	3	2	1	3	3	2	3	3
	8	3	3	3	2	2	3	3	3	2	2	3	3	3	3	3
Peer Support	9	3	2	2	2	1	3	3	3	2	2	3	3	2	3	3
	10	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3
	11	3	2	2	2	2	3	3	3	2	2	3	3	2	3	2
	12	3	3	2	2	2	3	3	3	2	2	3	3	3	3	2
TS	13	3	3	3	3	1	3	3	3	2	2	3	3	3	3	3
PBL	14	3	3	2	2	2	3	3	3	2	2	3	3	2	2	2
SCI	15	3	3	2	2	2	3	3	3	2	2	3	3	3	2	2

According to the first and second items of the observation form, Groups Bacacılar was highly motivated and ready to achieve project goals; in the second period, their desire of study decreased and they were again aware of their responsibility and did their tasks with a great motivation. Two members of Group Turkuaz were well-motivated at the beginning of the study but due to the other member were not; and in other periods, they all were aware of their responsibility and did what had to be done. Group Menekşe's all members were not conscious and did not do their tasks except for the one in the first period; then they all studied in the second period. In contrast to one member of the group, the other two members studied less in the last period. The members of Group Gül did not work efficiently and do their tasks on time; and they

had conflicts with each other in the first two periods. In the last period, however, they were responsive and completed their project.

In the third and fourth items, Group Bacacılar took and implemented group decisions while developing their projects in all periods; but one of the members of the group was impassive about the project in the second period. One of the high achievers of the Group Turkuaz leaded her group mates more than enough in the first period; therefore, the others were a bit noncommittal in this period; however, they were completely engaged in group decisions and their implementations in the other periods.

In the fifth item, Group Bacacılar, Group Turkuaz and Group Menekşe determined their goals excitedly in the first period and went on developing and implementing their goals in the next periods. Group Gül and Group Boyacılar could not determine their goals completely until the third period.

In the sixth and seventh items, Group Bacacılar sometimes arranged meetings in the first period and they did meetings adequately in the following periods, but all group members did not attend to group meetings so frequently. However, they all came to meetings in the last period. In the first period, Group Turkuaz did not hold enough meetings and one of the members did not attend meetings; but they held meetings and all attended them in the following periods. Until the last period, Group Menekşe held meetings and attended them generally; but the two low-achievers did not attend to all meetings actively in the last period. Group Gül did not arrange meetings and not all of them participate in meetings so much in the first two periods; however, they attended their meetings altogether in the last period. Group Bacacılar met a few times with two or three members of the group in the first period; they did not arrange

any meeting in the second period, and then in the last period, they all came together and worked collectively.

In the eighth item, collaborative group work facilitated personal development of the members of Group Bacacılar, Group Turkuaz and Group Menekşe in all periods. On the other hand, not all members of Group Gül and Group Boyacılar showed personal development absolutely in the first two periods; and they improved personally in the last period.

Group Bacacılar helped each other as noted in the ninth item. Group Turkuaz sometimes offered assistance when their peers did not require help at the first stage of the project term; but they helped each other generally in the other stages. Members of Group Menekşe helped each other when they said that they needed help generally in the first and third periods of the project terms; but they helped their peers without being wanted help in the second period. The members of Group Gül sometimes helped their peers in the first two periods but they helped each other generally in the last period.

According to item 10, all students gave and got help from their peers whenever they stated their need for help in all stages apart from that Group Boyacılar sometimes helped their peers even if they needed help in the first period of the project term; however, they also started to give a hand to their peers when they wanted help later.

Group Bacacılar shared their ideas, expectations and resources during the project work according to the items 11 and 12. The members of Group Turkuaz sometimes shared their ideas and expectations in the first period but they generally shared later. They also shared their resources during the project term. The high-achiever of Group Menekşe sometimes worked individually without sharing in the first and third

periods; in the second period, however, they debated on project issues. They sometimes gave and got resources from their group mates in the first period and more frequently in the following periods. Group Gül sometimes shared their ideas, expectations and resources until the second period; then they shared generally. In all periods, Group Boyacılar sometimes shared their ideas, expectations, and resources.

Group Bacacılar, Turkuaz and Menekşe did not hesitate to ask for support from their teachers. Group Gül applied to teacher support in the first and third periods generally; however, in the second period they sometimes asked even when they needed. Group Boyacılar asked almost no question in the first phase. In the second phase, they were sometimes supported by their teacher and they took teacher support generally in the last phase.

The members of Group Bacacılar and Group Turkuaz were always in an effort to discover new things such as adding unusual things like poems, riddles or animations to their web sites during the project term. Group Menekşe was in an effort to complete tasks more than to do creative things in the first and third stages; but they were on the way of searching dissimilar things such as adding both text and sounds to tell the subject. The members of Group Gül and Group Boyacılar did not apply to their creativity so much during the project.

The members of Group Bacacılar and Group Menekşe studied both to learn science subjects and to gain computer skills. They asked about and searched on both lessons during the project. Group Menekşe wanted to complete rather than to learn in the first stage; however, they had an effort to learn about both lessons after seeing they were able to do that. The members of Group Gül and Group Boyacılar posed less learning effort; rather they were worried about whether they would complete tasks or not.

Additionally, the researcher observed that all students helped each other not only about their science subjects and the web site design program but also about basic computer skills. They developed themselves in basic computer usage as well.

According to observation of the researcher, there were 3 types of groups:

- Groups whose members were mostly high-achievers (Bacacılar, Turkuaz)
- Groups whose achievement level of one member is higher than the others (Menekşe, Gül)
- Groups whose all members were average students (Boyacılar)

Bacacılar and Turkuaz groups had similar group structures. The groups were generally motivated to learn new things and complete the project successfully. P8 and P13 were the members studied less than the other members. P8 was behind their peers as he was jealous not to have Internet connection at home and he thought that he could not have competed with them. P13 was lower achiever than her peers; she did not have enough self-confidence in such a complex task at the beginning of the project term.

In Group Menekşe, P9 was the leader of the group. She was an average student but a high achiever in comparison with their peers. Therefore, there were times when she could not trust her peers but she was the catalyst in doing their tasks. She gained more and more self-confidence as she completed tasks successfully by engaging actively in the process.

The leader was P7 in Group Gül. She was again relatively hardworking than her peers in computer lessons. She could lead one of her peers but she had conflicts with the other member until the last period of the project term. This sometimes decreased the motivation of members.

Group Boyacılar was composed of average students; therefore, they did not admit the concept of leading concept. Every member wanted their peers to admit his ideas and so they could not develop their projects as rapid as the other groups.

CHAPTER 5

CONCLUSIONS AND IMPLICATIONS

In this chapter, the results obtained from the study are discussed, supported by the literature findings. Then, major points implicated from this study are stated in order to enhance future practices. Finally, further implications are listed for future researches in the light of the findings of the study.

5.1. Major findings and discussions on participants' perceptions about collaborative work

The participants commented on points related with collaborative group work under three headings. First, their perceptions including their preferences and challenges about collaborative group work were discussed. Then, what they perceived about peer support was presented. The data were gathered from the interview and supported with researcher's observation form.

5.1.1. The learners' perceptions about collaborative group work

The results show that students have positive attitudes towards collaborative learning. All of the participants thought that they could not have done the project on their own as well as they did with their group mates because they considered that with the help of collaborative group work, they improved their projects by helping each other, learning from each other, sharing their knowledge and ideas with each other. Therefore, the majority of participants declared their preference of performing a collaborative group work rather than working individually. In the study of Greenop (2007), students are similarly observed to prefer small-group works due to the increased ability to discuss, share and negotiate, breaks after lessons, understanding the subject more fully and meeting with their friends (pp.365-366). Livingstone and Lynch (2002) also found that students approached collaborative group work positively although their attitudes were negative at the beginning of the study (p.234).

The participants took group decisions together. They debated the alternatives with their group mates though the group leaders provided suggestions on many decisions, which is consistent with the research of Serrano and Pons (2007, p.226). Furthermore, according to the results, the projects of all groups were finished successfully and all members contributed to the success of the projects. Collaborative group work was very effective in this point as students could not endanger the success of the whole group. Moreover, weekly assessments might be affective on these results as the teacher gave marks to both individuals and groups every week. Moti and Abigail (2006) also found that continuous assessment triggered students' study and encouraging their learning (p.39). Another reason was that the project they created would be used by other students and they would attend a competition with their projects.

Students also thought that collaborative group work facilitated their personal developments. Gupta (2004) claimed that collaborative learning was very beneficial for students in terms of the improvement of higher-order skills such as communication, teamwork, lifelong learning and problem solving (p.63). According to some of the participants, their communication skills developed with the help of collaborative group work. The findings of Gupta's research (2004) supported that students' ability to communicate became better as a result of being accustomed to expressing their ideas and thoughts openly during collaborative group work (p. 63).

Collaborative group work improves students' learning process and helps to develop their academic knowledge (Neo, 2003, p.462). According to the results, the participants in this study improved their knowledge by learning from their group mates, discussing on how to do and mutual help, which is consistent with the view that the more students get high level of help during collaborative group work, the more they learn in depth as the findings of Webb's research (2003) put forward (p.361). They gained relevant knowledge both about science and computer in the

context of collaborative group work. They seem to prove this claim by uttering that they could tell their project subjects before they learned in the lesson or they could not forget by remembering the difficulties in the project. The research of Howe, Tolmie, Thurston, Topping, Christie, Livingston, Jessiman, Donaldson (2007) supported this claim as they found that students' gaining knowledge was predicted by proposing and explaining knowledge in the context of collaborative group work (p.560).

One of the participants said collaborative group work helped her to develop her creativity. Callaghan also states that creativity is enhanced with the help of group work (as cited in Livingstone & Lynch, p.221). The researcher also observed that students tried to add unusual and entertaining objects to their web sites such as puzzles, riddles or different animations to provide a good suggestion to his/her group to bring them success in comparison to other groups. Atasoy, Genç, Kadayıfçı and Akkuş (2007) supported this claim, stating that students do tasks together in terms of competing each other in collaborative learning environment (p.13). By supporting this view, the participants in this study both cooperated with their group mates and competed with other students in the class. They tried to find different things by using their creativity and added them to their web sites to do the most successful project.

The students reported that they took care of their tasks due to the fact that if they had not, not only they but also their group mates would have been affected by that. Therefore, they thought they were more conscious of their responsibilities in the collaborative group work. The observation of the researcher also supported the results that even low-achiever students tried to do their own tasks. Therefore, we can conclude from this result that when tasks of members are determined and groups have a task-oriented manner, responsibility does not fall on the shoulders of high-achiever of the group, which supports tentative explanation of Livingstone and Lynch (2000, p.232).

The researcher observed that students did not interact before in a positive manner, and additionally they were not accustomed to doing anything together. With the help of group work, they learned to work collaboratively. When they worked individually, they saw their friends as their competitors; but now the interaction among the students become task-oriented owing to the collaborative work, which is consistent with the result of Gillies (2003, p. 41). They understood that they would not be alone during their lives. That is, their social skills were improved while studying, discussing, sharing, designing and achieving together during the project-based learning.

By working collaboratively and interacting with each other, the students' social skills developed including listening to each other, accepting other's ideas, considering from other's views, stating their ideas without hesitating, solving problems that aroused, and sharing tasks and resources, all of which helped them to work productively (as cited in Gillies, 2003, p.36). The participants in this study valued others' ideas, stated their own ideas and negotiated with them. Although there sometimes appeared disagreements among group mates, they knew to solve them and continue developing their projects, so besides sharing and negotiating, they improved their problem solving skills. Similarly, Chanlin (2008) claimed that disagreements could enhance interaction among members (p.63).

Helping to their friends, doing web design, researching and unifying what was done were among the contributions of participants to their groups. According to the researcher's observation, the participants did their own tasks and helped each other when somebody needed assistance but they did not take over common tasks of the project fairly. Generally, high-achiever students performed the heavy points of them as it is also resulted in Mulryan's study (1994, pp. 289-290). But this did not cause

other students to withdraw themselves. Due to the fact that those high-achievers spent more effort and time, they were seen as a leader by the group.

Collaborative group work was both motivation and sometimes intimidation component of the project-based learning. They were pleased to work collaboratively as they got help when they had a problem; they shared their ideas and discussed how to realize them with their group mates. Hom, Harry, Berger and Mark (1994) claim that collaborative work motivates students as they solve problems more quickly, communicate better and make their tasks easier (p.87). On the other hand, when they cannot come to an agreement, group work may decrease their desire to study until the problem is solved. It would be reasonable to think that those disagreements create more appropriate context supporting their learning indirectly (Howe, Tolmie, Thurston, Topping, Christie, Livingston, Jessiman, Donaldson, 2007, p.560). However, disagreements that emerge when a member does not do his/her task might affect learning process negatively. When there is no mutual participation, there starts to appear disagreements and displeasures within groups (Barron, 2000, p.432).

Student selected groups affected group negotiation positively. Even when they were not able to come to an agreement, they could not bother and had to negotiate. Otherwise, when they had not had the right of selecting their group mates, they would have complained about and hided behind that.

Most of the students said that three-people group was the most appropriate group size to work together. They thought the number two was not adequate as they might not be able to overwhelm such a project and they could not work with more than four people, thinking that their disagreements in the group might increase. Gillies (2003) obtains the same result in his research that collaborative learning can be improved by not exceeding four peers in a group.

5.1.2. The learners' perceptions about peer support

All participants stated that they came together to work on the project but not all members could meet frequently. It would be due to the lack of computer and Internet connection at their homes. They had only breaks (4x10 minutes), lunch times (one hour) and the course hours (two and a half hours per week) to work collaboratively in the computer laboratory at school and not only the 7th grade students but also all other students at school used the computers at the computer laboratory. Furthermore, as the students stated conforming all members' free time to each other was difficult. To decrease the possibility of having difficulties in working together, students must have meeting time and learning environment set apart for them. That is, they are able to study whenever they want.

According to the results of the study, all members of the participant groups helped each other when their group mates stated that they needed help. Most of the low achievers had a tendency not to help without someone's demand. This might be because they did not feel self-confident at times. On the other hand, all peers completed their own tasks successfully at the end of the project periods and helped their group mates in carrying out the group tasks. However, not all of them took over all tasks fairly. Some of them, whom their group mates accepted as leaders, did group tasks more than the others. These students' social skills and achievements might be the reason for this.

The students learned from each other according to the interview results and the observation of the researcher. They thought that their projects were better than a work performed individually since they had an opportunity to learn from their group mates as found in the study of Ferguson-Patrick's (2007, p. 159). Learning from a peer is valuable especially for students hesitating to ask questions to their teachers because by means of collaborative group work, they own a peer-tutor they can ask whenever they need. Mulryan (1994) indicates that high achievers spend more time

on tasks and realize better qualified tasks than low achievers, which causes low achievers to have less in-depth understanding and less active participation in learning processes (pp. 289-290). According to the researcher's observations in this study, low-achievers also had less in-depth understanding than high-achievers; the reason for this, however, might not be the collaborative group work. Rather, they might have benefited from their group mates' more complex knowledge with their peer tutoring and showed increase in social participation as found in the research of Chen (2004, p.365). Gillies (2003) also found that students from all ability levels could make their knowledge and ideas a part of the learning environment and so constructed their own knowledge (pp. 46-47). The important point is not bringing high and low achievers to the same level in terms of learning but make all of them benefit from the learning environment. Furthermore, all of the group members in this study did his or her tasks successfully and they thought that collaborative group work provided them to learn from their peers, consistent with the presupposition that students carry out their tasks and construct their knowledge with the help of their peers (Jadallah, 2000, p. 225).

None of the participants thought that they suffered from active participation of their high achiever peers. The reason for this might be that high achiever students did not exclude them from the group and they helped them to complete their tasks. On the other hand, according to the interview with one of the average students, she would not have learned so many things if she had done the project with high-achievers of the class. That is, she thought that she learned more with her peers who were lower-achievers rather than with peers who were higher achievers. Moreover, according to the researcher's observation, it was seen that another average student could have been more active if she had not studied with one of the high achievers of the class because the average student gives importance to her lessons; therefore, she studies to prevent this. While a high achiever in their group spent a great effort for the project, she showed less effort. Further research can be done to learn whether average students may be affected from the behaviors of their high achiever group mates.

In addition to learning from each other, the participants debated on possible ways of carrying out their tasks and they shared their ideas with their group mates, as a result, they benefitted from each others' ideas to construct their own knowledge and reflect it to the project. This point is also supported by the research of Clark, Anderson, Kuo, Kim, Archodidou and Nguyen-Jahiel (2003, p.181).

Besides positive perception of peer support, the participants were sometimes annoyed with disagreements in the group. Moreover, one of the students did not want to work with peers as she had to wait for her group mates to answer her questions. According to the researcher's observation, her group mates did not exclude her from the group study or ill-treat her; on the contrary, they were helpful towards her. It can be concluded from this that the reason might be some weakness in her social skills.

5.2. Learners' perceptions about teacher support

All participants said that they were supported by the Information Technologies teacher but not all of them got support from their Science and Technology teacher. This might have several reasons; however, the main reason is that the students did not have computers in their Science classrooms. Therefore, they had to go to computer laboratory located in another building to ask something by showing their project, which they might have found time consuming. Another reason might be that the teacher may have been indifferent to the project at the beginning of the project-based learning; or this might be the outcome of the weak relationship between the teacher and the students. Still another reason might be the lack of feedback through the forum. However, it is accepted that feedback or corrections from teacher enhance students' knowledge gains (Howe, Tolmie, Thurston, Topping, Christie, Livingston, Jessiman, Donaldson, 2007, p.560). Majority of the students, nonetheless, wanted support from the Science and Technology teacher especially for the content and the resources about science while Information Technologies teacher supported them in web design and visual components of the web page.

5.3. Major findings and discussions on participants' perceptions about developing web pages on science subjects in the project-based learning environment

In this section, participants' perceptions about project-based learning, technology integration to Science and Technology projects and forum usage were discussed and supported with the literature.

5.3.1. The Learners' perceptions about project-based learning in computer lessons

The students found it enjoyable to attend such a project-based learning as they were proud of what they had done and of the fact that somebody else would use it as found in the studies of Curtis (2002) and Chen & McGrath (2003).

The majority of students stated that they enjoyed doing project in Information Technologies lessons. They thought that they learned the subjects in lessons permanently and better with the help of project based learning. The results are consistent with the outcomes of previous studies (Asan & Haliloğlu, 2005; Chen & McGrath, 2003). Some of the students stated that their success was the outcome of the enormous help they could get from their teachers and friends. One of the students stated that he had neglected his questions when he was short of time to complete his homework; nevertheless, he had adequate time in the project to ask about the points he had difficulty. To cerate a big project might be the cause of students' learning much since according to the researcher's observation, they used their all computer skills and learned new ones apart from the program to finish this project successfully. As Özdener and Özçoban found that they practiced their knowledge of Ms. Office, Paint and the Internet (2004, p. 179).

Two students said that they were not afraid of using computer anymore. This was resulted from the fact that they gained self confidence after creating a big successful project not only about web designing but about using computer. One of them told the researcher that she did not want to do homework which must be done on computer before but she stated later that she could cope with such a study. This conclusion in the study is also supported by Mioduser & Betzer (2008) Asan & Haliloğlu (2005).

Most of the participants appreciated their projects at the end of the term. The dominant feeling among them was the proud they felt; they did projects better than they expected, which was consistent with the research findings indicating that students value their achievements when they finish as found in Chen & McGrath (2003) and Chanlin (2008). Therefore, they gained more self-confidence at the end of the project. One of the participants said that she thought she could not do it at the beginning of the project period but she admitted later that she wanted to do it again because she was sure she could achieve such a study once more.

The students stated that they were also relaxed at the end of the project. This was due to the difficulty of the project that made the term harder than any other terms; therefore, it is seen that they did not have positive feelings about the project all through. Since the students studied on long term and a complex project, they were sometimes disappointed, worried or uncertain as already indicated in the research of Chanlin (2008, p. 60); therefore, some of them stated that they were tired at the end of the project term and some of the students demanded that not to be so difficult that they were not forced with the project as much as did in this project.

In addition to positive attitudes toward project-based learning, there were also negative comments about it. Only two students did not find their projects very successful and one of them said that they were forced too much; therefore, he did not

want to do such a thing again. The reason for this might be the relation among their peers because both of the students experienced conflicts with one of their group mates, especially in the second period of the project term, which caused them to develop their project with so much disagreement. Another reason might be that they had difficulties as they were not accustomed to project-based learning as Matovinovic and Nocente (2000) stated students may be forced to pass from traditional environment setting to constructivist environment (pp. 116-117).

When students were asked about motivation components about the work, two students regarded the project-based learning as motivation component, supporting the presupposition that design projects and interactions make the learning process enjoyable (Chen & McGrath, 2003, p.417). The reason why only two students had seen it as motivational might the thought of that nobody would have used their web site or the project had been too complex for them to be able to perform, which were the intimidation components at the beginning of the project-based learning as they stated in the interview. However, all of them thought their projects were usable at the end of the project-based learning.

The most exciting result was students' reading, understanding and purifying the science subjects from unrelated subjects while searching on the Internet and then using it in their projects because they had only copied and pasted the information they found in web sites in their previous homework. This might be caused due to the fact that their projects would be used by 7^{th} grade students in real life. Being used in a real life also prevented the claim of Hofstein and Lunetta (1982) that students focus on design process rather than learning (as cited in Blumenfeld, Soloway, Marx, Krajcik, Guzdial and Palincsar, 1991, p.379).

5.3.2. The learners' perceptions about using technology to prepare collaborative science project

The majority of the participants stated that searching on the Internet was faster, easier and it provided them with much richer and more resources than found in books or encyclopedias. The reason why students found searching on the Internet so valuable might be their interest in computers and the Internet or geographical location of their houses where no library existed and school where one school library existed with very few resources. This result supports Blumenfeld, Soloway, Marx, Krajcik, Guzdial and Palincsar (1991)'s claim that information is more accessible through technology as all students can access without thinking their geographical condition, access massive amounts of information and access both static and dynamic information (p.385), which also supports Matovinovic and Nocente (2000). In another research, students saw the technology as a mere resource they could get faster and direct information than books (Waight, Abd-El-Khalick, 2007, p. 171).

Their interest in visual and dynamic resources such as colorful pictures, videos and animations was also the cause of their beliefs that computer and the Internet made their projects better. They stated that they could not have done their projects so enjoyable if they had not use computer. According to Blumenfeld, Soloway, Marx, Krajcik, Guzdial and Palincsar (1991), visual components such as sound, video, animation, graph and color pictures facilitate intellectual accessibility of students (p. 386). This also affects their motivation to spend time and effort on their projects. As finding and adding visual components, they appreciate their projects.

The students enjoyed learning about science subjects while doing project in Information Technologies lesson. In accordance with what Matovinovic and Nocente (2000) found, they both learned science concepts and improved their computer skills (p. 116). Their motivation was affected positively with the help of technology while exploring new concepts, constructing their knowledge and representing them in an

attractive manner as claimed by the research of Blumenfeld, Soloway, Marx, Krajcik, Guzdial and Palincsar (1991, p. 386).

Some of the students' motivation decreased when they could not find relevant information about their subject as stated in the ChanLin's (2008) research (p. 61). However, they got rid of this disappointment after finding it with the help of their teachers and group mates.

All of the students thought that the project enabled them to learn their science subjects efficiently. They thought that their experiences gained in this project would help avoid forgetting their learning. That is, they stated that they related their learning with the project design, so it would not be isolated but connected as stated in the research of Marx, Blumenfeld, Krajcik and Soloway (1997, p.355). Furthermore, students formed meaning and discovered relationship by collecting, organizing and presenting information which is consistent with the research of Matovinovic and Nocente (2000, p.116).

5.3.3. The Learners' perceptions about forum

Most of the students did not use the forum actively to communicate with their friends and their teachers. They were all in the same class at school and most of them could use the forum only at school because of a lack of computer and Internet connection at their houses. Therefore, they thought that they did not need to use the forum as they could communicate directly.

There was only one group whose two members had a computer and Internet connection at home; even they did not want to use it as they stated that using chat programs are easier to log on and to make computer-based interaction. Forum archives and interview results showed that students who sent messages through the forum were pleased to have a platform that they could send their project documents to show their friends and to follow documents their teachers sent.

The students had positive attitudes towards communicating with teachers through the forum; however, the tool was not efficiently used as they were not able to write messages while they were at home and to get the answer from the Science and Technology teacher. The Information Technologies teacher was not at school on Fridays and they could communicate face-to-face mostly. On the other hand, the Science and Technology teacher was at school only on Mondays, Tuesdays and Wednesdays; therefore, students wanted to communicate with him on the other days; however, they could not get answers. They wrote messages to the forum and waited him to reply; but he only logged in and wrote them at school on Monday, Tuesday and Wednesday as he did not have Internet connection at his house. However, as Rovai (2007) states online instructors must access forums regularly and frequently, send messages everyday, focus on the work, encourage students continuously through the forum and send response in a short period of time (pp. 82-83), which also supports Guzdial and Turns' finding (2000, p .466).

In spite of all these negative points, most of the students thought that the forum was beneficial for their projects as they could share resources, consult with teachers and peers and discuss about the project through the forum. By examining their peers' works and getting feedback both from their teachers and peers, they gained a better Understanding of how and what they were required to do (Lou & MacGregor, 2004, p. 436). Furthermore, one of the students stated that the forum was valuable as their teachers could follow their work as stated in the research Lou and MacGregor (2004, p.436).

5.4. Implications for practice

The most important implication of this project was that most of the students found the project enjoyable as it had many characteristics such as its interdisciplinary aspect (the project provided them to learn about both Information Technologies and Science and Technology lessons), collaborative work aspect (they worked together

and were supported by their peers), asynchronous aspect (they sent messages and documents), designing aspect (the popular subject of webpage designing attracted students' attention), real life project (it was usable by some others), competition (they would attend a competition with their projects) and teacher support (they could apply and get more support from their teachers). As a result, all students could find many sides they liked in the project and this motivated them. Other specific implications are as follows:

1. This study showed that the participants' aware of responsibility was increased with the help of collaborative project-based learning. Although not all of them did their weekly tasks on time, all students, including low-achievers, completed their tasks at the end of the study. Students who did not want help even from their teachers before demanded help from their group mates and teachers now. This prevented them from giving up their tasks when they faced a problem.

2. The highest achievers and the most motivated students of the groups made their peers study by leading and motivating the group. Some of the groups determined their leaders on their own although they were not aware of this; some of them admitted the concept of being leaded; but those groups who could not admit this did not go on developing their projects until the teacher assigned a leader from the highest achievers on the project's weekly tasks. Therefore, the observation of teachers was important in this context to be able to assign a leader fairly when needed. The students in the research of Payne, Monk-Turner, Smith and Sumter (2006) also commented that leaders must be appointed for each group (p. 443).

3. Weekly task schedule and assessments were also affective on students' success. It enabled students to study in a more disciplined way. That is, they studied on project smoothly step by step. If the points they were graded when the tasks were completed had be given in the schedule, students might have motivated more and all students would have done their tasks on time.

4. Informing students about how they would be graded affected collaborative group work positively, which supports Payne, Monk-Turner, Smith and Sumter's research (2006, p.447) as they are graded with doing their tasks and fulfilling their responsibilities about collaborative group work.

5. Not only low-achievers but also the others thought that their projects were more successful than the ones they did individually. They enjoyed helping and getting help from their friends. In fact, having support from someone else apart from their teachers when they had a difficulty made them relaxed.

6. Although most decisions were taken with the help of the suggestions of high-achievers of the group, decisions nevertheless were taken as a group. Sometimes, low-achievers only admitted or denied the suggestions of their friends and sometimes they suggested something. This showed that the study helped the students to see that everyone had a right of stating their ideas and all their friends, even low-achiever ones, could give worthy suggestions.

7. With the help of collaborative group work, students learned sharing their ideas with each other. They enjoyed listening to somebody else's ideas and stating their own ideas to somebody else. They realized that the more ideas of students contribute to the project, the better and richer the project gets and the more valuable projects they could achieve together.

8. Students cannot learn everything that is taught at lessons. They may not be able to understand topics, they may not concentrate adequately during lesson hours; as a result, they may not be able to listen to attentively. Due to these reasons, even the high-achiever students could not catch all the points the teachers told in the lesson; therefore, they had difficulty in dropped points and they stated that they applied their peers to learn those points. The low-achievers also benefitted from their peers' experiences very much. They had more difficulty than their peers and they hesitated to ask their teachers whenever they had difficulty and they also applied their peer-tutors.

Collaborative group work and their experiences also enabled them to learn permanently.

9. The researcher observed that nobody in the classroom hesitated to ask someone about his / her problem and nobody denied his or her friend's help demands. Communication among students and social skills of students were affected positively from the collaborative project-based learning. They started to realize that needing help was quite usual as they had a problem and got help from someone else also; and they saw their friends as their cooperators much more than competitors.
10. Disagreements and conflicts among students appeared; but they were able to solve their problems. The teacher did not immediately intervene with the problems but waited for them to solve their own problems. However, intervention on time was crucial as some of the members were too tired of dealing with problems, which decreased their motivation. Therefore, the teacher must be a real observer and must not be late for support.
11. Group size on this target audience group must be three as conflicts increases with more members and sharing decreases with fewer members.
12. Students had difficulty in doing group meetings within this context. The results suggested that there should be group meetings regularly as stated in Gillies' research (2003, pp.45-46) and Payne, Monk-Turner, Smith and Sumter's research (2006, p.444). Furthermore, the teacher and group members should decide the meeting times together. The meeting times must be the times the teacher can observe them.
13. Collaborative group work provided help especially for students who could not want help from their friends comfortably as they could demand from their group mates.
14. Students involving in such an implementation should have computers which are used for the project in science and technology class so that they have a

chance to study more and to benefit from their Science and Technology teacher more.

15. Students wanted help from their Information Technologies and Science and Technology teachers more comfortably. As the time period was long, they did not neglect their problems. Moreover, the teachers were more accessible for support as they gave a duty that would be done out of lessons.
16. Students achieved a big, complex project and this project will be used by other students. This motivated them to study and provided them with self-confidence.
17. Çilenti (1985) stated that students whose autonomous learning skills do not develop might have a big difficulty in project-based learning environment (as cited in Saracaloğlu, Akamca & Yeşildere, 2006, p. 247). This study also supports this claim and it suggests that tasks must be scheduled carefully so that none of the students get overload and teachers must follow students' project processes closely and provide alternative solutions before the problems grow up.
18. Students prefer benefitting from the richness of computer and the Internet especially in learning environments that do not provide rich sources for students. In this context, the students worked with computers more delightfully as they could reach sources which they could not find at school library and at their houses. Videos, colorful pictures, and animations were also the reason for students' motivation to work with computers.
19. Students who had negative attitudes towards computers enjoyed taking place in the project as they liked science subjects or vice versa. Therefore, interdisciplinary projects both increase the possibility of turning the project to a form students like and allow students to learn many subjects at the same time.

20. While working collaboratively, solving problems, creating projects, searching, analyzing, synthesizing and designing information, they associated their learning with their experiences; consequently, their learning becomes more permanent.
21. Students had a limited time to use asynchronous communication tool in this context. In order to allow students to benefit from the tool effectively, they should have time and place flexibility to use asynchronous communication tool. Moreover, teachers must pay necessary attention to answering students' post in a short period of time.
22. To provide a platform where students could share documents and see project documents whenever they wanted was valuable for students. Moreover, they appreciated teacher support through the forum.

5.5. The action plan as a result of the implementation of new practice

At the end of the implementation of the new practice, I have decided to implement the following action plan in order to improve the practice with the help of the data gathered from the students and supported by the literature.

1. Student selected groups will be formed.
2. Group size will be three.
3. Groups will select their own subjects from any discipline.
4. Group members and the teacher will determine weekly meeting hours for each group, group members will be assessed in attending meetings and the teacher will also attend the meetings.
5. Weekly task schedule including points students were graded for each task will be given at the beginning of the project term.
6. Students will be informed about the assessment process in more detail. That is, in addition to web site evaluation rubric, students should be given

information about the percentages of web site evaluation rubric, collaborative working, and weekly tasks in grading.

7. Students should have computers in Science and Technology classroom so that they study on the project whenever they want and so they interact with their Science and Technology teacher more meaningfully.
8. If the forum component will be included in the project, i.e. if the students will be supported with an asynchronous communication tool, head official of the district will be applied for the approval of students' computer and Internet usage in the office of chief in villages or cities so that they will have the opportunity to use them in certain hours.
9. A contract can be signed with the teachers form other disciplines. It will be about that they will support students face-to-face and through forum when students need it and they will sign in the forum at least four times a week and posts related with their disciplines will be replied.
10. Students will be given more time for the tasks shown in *Appendix D* so that they will not be overloaded.

5.6. Implications for further research

1. The study can be reexamined as the second cycle of action research by implementing adjusted action plan.
2. Teachers' perceptions can be searched in order to improve the practice.
3. In order to generalize research findings, the study can be implemented using survey research method.
4. In this study, all students did their assigned tasks; but not all of the students spent the same effort and time for group tasks. High-achiever students undertook more tasks and this has been criticized by some of the researchers as they thought that they learned much more than low achievers. However, this may be prevented by means of providing students with all assigned tasks**,** which supports Payne, Monk-Turner, Smith and Sumter's research (2006,

p.444); and it can be searched to see whether there are significant differences between learning amount of high achievers and low achievers by examining their pre-tests and post-tests.

5. Students did their homework by searching on the Internet, copying and pasting information without reading and understanding the meaning before this project. In this project, they read and rewrote their findings, or eliminated irrelevant information as the projects would be used in a real life. It can be further analyzed whether searching capabilities have developed or not in future researches.
6. In this research, it was observed that collaborative group work increased self-confidence of average students who worked with low-achievers. It can be searched to observe whether this changes when they work with other average students or high-achievers and whether average students may be affected from the behaviors of their high achiever group mates.
7. One of the students stated that they communicated with his peers through a synchronous communication tool although they were not responsible to use the tool. Synchronous communication may be a better choice for web-based communication.
8. Further researches should be done by integrating technology to other disciplines in collaborative project-based learning environments.

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APPENDIX A

INTERVIEW QUESTIONS

Bildiğin gibi ben master yapıyorum ve şu an sizin de katkılarınızla bilimsel bir araştırma yapıyorum. Şimdi bu araştırmanın bir parçası olarak sana sorular soracağım. Yalnız bu sorulara doğru ve gerçekten düşündüğün gibi cevap vermen bu araştırmanın güvenilirliği dolayısıyla bilimi yanıltmaması açısından çok önemli. Şimdi sana bu dönem birlikte uyguladığımız web sitesi projesi ve onu nasıl hazırladığınız hakkında sorular soracağım. Sorular oldukça basit. Bu sorular senin bilgini ölçmek için değil, tamamen bu dönem yaptığınız proje hakkındaki düşüncelerini öğrenmek için. Verdiğin cevapları kesinlikle bir başkası bilmeyecek, sadece ikimiz arasında kalacak ve senin ismin geçmeden ben onu yaptığım araştırma için kullanacağım. Ayrıca verdiğin cevaplar notlarına da yansımayacak. Zaten notlarınızı verdim. Kameradan çekinmene kesinlikle gerek yok, bu sadece sen konuşurken verdiğin cevapları yazmaktansa seni dinlemek istememden kaynaklanıyor. Yani, verdiğin cevapları kayıt edebilmem için gerekli. Mülakattan sonra bu kaydı dinleyerek cevaplarını yazılı hale getireceğim ve araştırmamda kullanacağım. Kamerayı başka bir yöne çevirdiğim için, şu an sadece senin sesini kayda alıyor; görüntü açısından kaygılanmana gerek yok yani.

Şimdi, soracağım sorular hakkındaki düşüncelerini mümkün olduğunca doğru ve anlaşılır biçimde söylemeni istiyorum. Vereceğin cevap olumlu ya da olumsuz da olsa rahatça söyleyebilirsin…

1. Proje çalışmanız süresince forumu kullandın mı?

   -(Evet ise) Hangi amaçla (neden) kullandın?

   -(Hayır ise) Neden kullanmadın?

   (olası cevaplar: Foruma girerken hata veriyordu, zamanım olmadı, yazmayı sevmiyorum, kimse bana cevap vermedi, yararını görmedim)

2. (1 Evet ise)Sence forum projenizi hazırlarken çalışmalarınıza katkıda bulundu mu?

-(Evet ise) Nasıl katkıda bulundu?

- Öğretmenlerime istediğim zaman soru sorabildim.
- Arkadaşlarımla bilgilerimi paylaşabildim.

-(Hayır ise) Neden olmadığını düşünüyorsun?

3. Dönem projesini hazırlarken yaptığınız grup çalışması hakkında ne düşünüyorsun?

   -Grup olarak çalışmanın sana katkıları oldu mu sence? (Evet ise) Ne gibi katkılar sağladı?

   -Grup çalışması yaparken ne tür zorluklarla karşılaştın?

   -Grubunuzdaki herkes kendi görevini yerine getirdi mi?

   -Konuları paylaşırken herhangi bir sorunla karşılaştınız mı? (Karşılaştıysa) bu soruna ne sebep olmuş olabilir? Nasıl çözdünüz?

   -Yardıma ihtiyacın olduğunda grup arkadaşlarından yardım alabildin mi?

   -Proje süresince grup dışından bir arkadaşınla (gurubunuz dışında sınıftan başka birileri ile) hiç yardımlaştın mı?

4. Grup çalışması ile yaptığın projenin başarılı olduğunu düşünüyor musun? Tek başıma yapsam daha iyi olurdu diyebilir misin? Neden?
5. (3'te cevabını alamadıysan sor)Bu projeyi yaparken grup arkadaşlarınla nasıl çalıştın?

   -Forum aracılığı ile haberleştiniz mi? Proje süresince haberleşebildiniz mi?

   - Birlikte çalışmak için bir araya geldiniz mi? Ne zaman, nerede?
   - Bulduğunuz kaynakları birbirinizle paylaştınız mı? (Örneğin kaynak web sitesi adresi olabilir ya da grup arkadaşının konusu ile ilgili bulduğun bir animasyon olabilir)

6. Grupla ilgili bir karar almanız gerektiğinde, nasıl karar verdiniz? Kararları grup olarak mı aldınız, yoksa gruptaki bir kişi karar verdi diğerleri kabul mü etti?
7. Şimdi sana bir cümle vereceğim ve bu cümleyi okuyacağım. Senden bu cümledeki noktalı kısmı doldurmanı istiyorum. Noktalı kısmın uzunluğu seni yanıltmasın, boşluğu uzun birkaç cümle ile ya da istersen tek bir kelime ile de doldurabilirsin.

"Grup çalışması benim ……. geliştirmeme yardımcı oldu."

"Projeyi bitirdiğimde kendimi…….hissettim; çünkü……."

"Grup projesi ile bireysel proje arasında tercih yapsam, ……. "

"Bence bilişim teknolojileri dersinde dönem projesi hazırlamak…….;çünkü……."

"Bu projeye katılmak güzeldi; çünkü……."

"Bu projeye katılmak hoşuma gitmedi (zordu); çünkü……."

"Gruba en büyük katkım……."

8. Sence grubunuzun 3 kişilik olması uygun mu? Değilse, sence bir grupta kaç öğrenci olmalı? Neden?
9. Sence yaptığınız proje daha sonra siz ya da başka öğrenciler tarafından kullanılabilir bir kaynak mıdır? (Google'da bu konu ile ilgili kaynak arayan bir öğrenci, sizin web siteniz karşısına çıksa sizin web sitenizi kullanır mı?)
   -Ne amaçla (neden) sitenizi kullanabilir?
10. Bu projeyi hazırlarken neler senin çalışma isteğini artırdı? (Olası cevaplar: takım çalışması, daha sonra işe yarayacak olması, web sitesi tasarlamak, Fen ve Teknoloji dersi ve konularının ilgimi çekmesi)
    -Neler çalışma isteğini azalttı?
11. Biz Fen ve Teknoloji dersi konuları ile ilgili bir web sitesi yaptık, değil mi? Hazırladığınız projeyi düşünürsen, bilgisayarı Fen ve Teknoloji dersinde kullanmanın yararları konusunda ne söyleyebilirsin? (Yine bu konu ile ilgili ödev hazırladığını ama bilgisayarı kullanmadığını düşün, bilgisayarla yapmanın sana ne gibi katkısı oldu?) Görünüm & Öğrenme
    (Olası cevaplar: Görüntü olarak daha hoş olur, daha anlaşılır olur, uzaktaki insanlar da kullanabilir, biz bilgisayarı daha iyi, daha etkin kullanırız)
12. Bu projeyi yaparken öğretmenlerinden yardım aldın mı? (Aldıysa)Hangi konularda yardım aldın? (Ne için yardım aldın mesela?)
    (Olası cevaplar: Web sitesi yaparken takıldığımız yerlerde, kaynak ararken, forum kullanırken, içerik hazırlarken…)
13. Sence bu proje ……konusunu öğrenmene katkıda bulundu mu?

14. Yine grup çalışması yaparak dönem projesi hazırlamak ister misin? Neden?
15. Grubunuzda bir lider var mıydı? Kim seçti bu lideri? Neden lider oldu?

APPENDIX B

OBSERVATION FORM

Grup Adı: **... Periyot**

Genellikle	Bazen	Hiçbir Zaman
3	**2**	**1**

☐ Grup üyeleri gruptaki rollerinin (başarıya ulaşmak için grup içindeki fonksiyonlarının) farkındalar.
☐ Grup üyeleri görevlerini zamanında yerine getirdi.
☐ Gruptaki tüm üyeler takım kararlarında eşit bir şekilde yer aldılar.
☐ Grup tarafından alınan kararlar uygulandı.
☐ Grup olarak kendi amaç ve hedeflerini belirlediler.
☐ Grup toplantısı düzenlediler.
☐ Tüm grup üyeleri grup toplantısına katıldı.
☐ Grup çalışması, grup üyelerinin bireysel gelişimlerini destekliyor.
☐ Grup üyeleri yardımlaşarak çalıştılar.
☐ Üyeler grup arkadaşları yardıma ihtiyaç duyduğunda arkadaşlarına yardım ettiler.
☐ Grup üyeleri birbirleriyle rahatça fikirlerini ve beklentilerini paylaştılar.
☐ Grup üyeleri buldukları kaynakları birbirleri ile paylaştılar.
☐ Grup üyeleri ihtiyaç duyduğunda Bilişim Teknolojileri ya da Fen ve Teknoloji öğretmenlerine danıştılar
☐ Grup üyeleri sürekli öğretmene bağımlı kalmadan yeni şeyler keşfetme (siteye farklı yaratıcı şeyler ekleme, yeni kaynaklar bulma, vb) çabası içindeler.
☐ Grup üyeleri her iki dersten de (Fen ve Teknoloji, Bilişim Teknolojileri) öğrenme çabası içindeler.

Notlar:

APPENDIX C

WEB SITE EVALUATION RUBRIC

ÖLÇÜTLER	DERECELER		
	İyi (5)	**Orta (3)**	**Geliştiril-meli (1)**
1. Site hazırlanış amacına ve hedef kitleye uygun.			
2. Site tasarımı özgün.			
3. Arka plan ve yazı rengi zıt.			
4. Başlıklar, metinler ve butonlar her sayfada renk, yazı tipi ve şekil açısından tutarlı.			
5. Ana sayfada sitenin amacını belirten kısa bir paragraf var.			
6. Sitedeki metinler yazım kurallarına uygun.			
7. Metinlerdeki ifadeler sade ve anlaşılır.			
8. Önemli bilgiler kolay ulaşılabilir şekilde yerleştirilmiş.			
9. Kullanılan yazı boyutu hedef kitleye uygun.			

WEB SITE EVALUATION RUBRIC (CONTINUED)

10. Her sayfadan ana sayfaya bağlantı var.			
11. Sayfalardaki bağlantılar düzgün şekilde çalışıyor.			
12. Sitede kısa sayfalar kullanılmış.			
13. Bağlantılara verilen isimler erişilen sayfadaki bilgilerle tutarlı.			
14. Sitenin oluşturulma ve güncellenme tarihleri belirtilmiş.			
15. Siteyi hazırlayanın bilgileri (adı, soyadı, e-posta adresi vb.) belirtilmiş.			
16. Sitede kullanılan kaynaklar belirtilmiş.			
17. Sitenin organizasyonuna uygun site haritası var.			
18. Sitede işitsel, görsel ve yazınsal materyallere yer verilmiş.			
19. Aşırı derecede çoklu ortam nesnesi kullanılmamış.			
20. Sitenin kullanımı kolay.			
	( ) x 5 =	( ) x 3 =	( ) x 1 =
TOPLAM PUAN:			

APPENDIX D

TASK SCHEDULE

1. Konu araştırması 2. Konu başlıkları belirle 3. Konuları eşit bir şekilde paylaş	11 Kasım–19 Kasım
4. Kendi konunla ilgili materyal (görsel, yazınsal ve işitsel) topla	19 Kasım–29 Kasım
5. Grup olarak anasayfa tasarımını yap	29 Kasım–6 Aralık
6. Anasayfanın ve diğer sayfaların boş tasarımının son halinin teslimi	6 Aralık – 13 Aralık
7. Kendi başlıklarının sayfa tasarımını yap	13 Aralık–27 Aralık
8. Sayfaların geçerliliğini ve bütünlüğünü test ederek birleştir	27 Aralık–10 Ocak
9. İlk halini öğretmene teslim et	10 Ocak 2008
10. Son halini öğretmene teslim et	17 Ocak 2008

APPENDIX E

VOLUNTARY ATTENDANCE FORM

Bu çalışma Prof. Dr. M. Yaşar ÖZDEN danışmanlığında yüksek lisans öğrencisi Derya YAŞAR tarafından yürütülmektedir. Bu deneyin amacı; öğrencilerin Fen ve Teknolojileri konuları ile ilgili eğitim amaçlı web sitesi projelerini grup olarak hazırlama sürecindeki algıları hakkında bilgi toplamaktır. Çalışmaya katılım tamamıyla gönüllülük temelinde olmalıdır. Deneyde, sizden kimlik belirleyici hiçbir bilgi istenmemektedir. Cevaplarınız tamamıyla gizli tutulacak ve sadece araştırmacılar tarafından değerlendirilecektir; elde edilecek bilgiler bilimsel yayınlarda kullanılacaktır.

Çalışma, genel olarak kişisel rahatsızlık verecek soruları içermemektedir. Ancak, katılım sırasında sorulardan ya da herhangi başka bir nedenden ötürü kendinizi rahatsız hissederseniz deneyi yarıda bırakıp çıkmakta serbestsiniz. Böyle bir durumda çalışmayı uygulayan kişiye, çalışmayı tamamlamadığınızı söylemek yeterli olacaktır. Çalışma sonunda, bu deneyle ilgili sorularınız cevaplanacaktır. Bu çalışmaya katıldığınız için şimdiden teşekkür ederiz. Çalışma hakkında daha fazla bilgi almak için Bilgisayar ve Öğretim Teknolojileri öğretim üyelerinden Prof. Dr. M. Yaşar ÖZDEN (Oda: C–107; Tel: 210 4061; E-posta: myozden@metu.edu.tr) ya da Bilişim Teknolojileri Öğretmeniniz Derya YAŞAR (Ev Tel: 724 4050, Cep: 505 475 9408; E-posta: yasar_derya@mynet.com) ile iletişim kurabilirsiniz.

Bu çalışmaya tamamen gönüllü olarak katılıyorum ve istediğim zaman yarıda kesip çıkabileceğimi biliyorum. Verdiğim bilgilerin bilimsel amaçlı

yayınlarda kullanılmasını kabul ediyorum. (Formu doldurup imzaladıktan sonra öğretmeninize geri veriniz).

İsim Soyadı Tarih İmza

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APPENDIX F

PARENT CONFIRMATION LETTER

Sayın Veli,

Orta Doğu Teknik Üniversitesi Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümü olarak, Bilişim Teknolojileri ve Fen ve Teknoloji derslerini kapsayan "disiplinler arası bilgisayar destekli grup projesi hazırlamada öğrencilerin algısı" başlıklı araştırma projesini yürütmekteyiz. Araştırmamızın amacı öğrencilerin bilişim teknolojilerini fen bilgisi dersinde kullanmalarını, proje hazırlama aşamasında grup içi ve dışındaki iletişimlerini gözlemlemek, deneyimlerini dönem sonunda teslim edecekleri eğitim amaçlı bir web sitesi projesine yansıtmalarını sağlamak ve algılarını saptamaktır.

Katılmasına izin verdiğiniz takdirde çocuklarınız, dönem başında bilgisayara karşı tutumlarını ölçen bir anket dolduracak, dönem boyunca üç kişilik gruplar halinde Fen ve Teknoloji dersi konuları üzerine eğitim amaçlı web siteleri hazırlayacak ve dönem sonunda Bilişim Teknolojileri öğretmenleri Derya YAŞAR tarafından uygulanacak mülakata tabii tutulacaklardır. Çocuğunuzun cevaplayacağı soruların ya da yapılan uygulamanın çocuklarınız açısından herhangi bir negatif sonuç doğurmayacağından emin olabilirsiniz. Çocuğunuzun dolduracağı anketlerde ya da mülakatta cevaplayacağı sorularda verilen bilgiler kesinlikle gizli tutulacak ve sadece bilimsel araştırma amacıyla kullanılacaktır. Bu formu imzaladıktan sonra çocuğunuz katılımcılıktan ayrılma hakkına sahiptir. Araştırma sonuçlarının özeti tarafımızdan okula ulaştırılacaktır.

Anketleri doldurarak bize sağlayacağınız bilgiler, çocukların bilişim teknolojilerini diğer alanlarda kullanmalarında, öğrendikleri bilgiyi gerçek dünyaya yansıtmalarında ve bireysel değil grup halinde çalışarak gerçek dünyaya daha iyi adapte olmalarında büyük önem taşımaktadır. Araştırmayla ilgili sorularınızı aşağıdaki e-posta adresini veya telefon numarasını kullanarak bize yöneltebilirsiniz.

Saygılarımızla,

Derya YAŞAR

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Bu çalışmaya çocuğumun tamamen gönüllü olarak katılmasını onaylıyorum ve istediğim zaman yarıda kesip çıkabileceğini biliyorum. Verilen bilgilerin bilimsel amaçlı yayınlarda kullanılmasını kabul ediyorum. (Formu doldurup imzaladıktan sonra öğretmeninize geri veriniz).

İsim Soyadı Tarih İmza

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RESEARCH QUESTIONS AND THEME TABLE

Research Questions	Interview Questions	Common Themes	Other Themes
1. How the learners perceive collaborative work in the Information Technologies lessons? a. How the learners perceive collaborative group work?	3a. Grup olarak çalışmanın sana katkıları oldu mu sence? (Evet ise) Ne gibi katkılar sağladı?	Helping to each other (9) Learning from each other (6) (2c) Doing better (5)	Sharing more(P7, P8) Communicating better (P11, P13) Doing easier (P15) No (P5, later said Helping to each other)
	3b. Grup çalışması yaparken ne tür zorluklarla karşılaştın?	Coming to an agreement (7) Gathering the group mates (4) (2c)	No problem (P4, P2, P14) Studying as a group (P9, P3, P1)
	3c. Grubunuzdaki herkes kendi görevini yerine getirdi mi?	Has done their tasks (14) (2c)	Has not done completely (P1)
	3d. Konuları paylaşırken herhangi bir sorunla karşılaştınız mı? (Karşılaştıysa) bu soruna ne sebep olmuş olabilir? Nasıl çözdünüz?	No problem (15)	

RESEARCH QUESTIONS AND THEME TABLE (CONTINUED)

Research Questions	Interview Questions	Common Themes	Other Themes
	4. Grup çalışması ile yaptığın projenin başarılı olduğunu düşünüyor musun? Tek başıma yapsam daha iyi olurdu diyebilir misin? Neden?	A little bit successful (4) Successful (10) I can't (13)	Not successful (P5) I can (P7→ she could not be sure later P9→ she changed her idea)
	6. Grupla ilgili bir karar almanız gerektiğinde, nasıl karar verdiniz?	As a group (15)	-
	7a. "Grup çalışması benim ……. geliştirmeme yardımcı oldu."	Helping to each other (4) (2c) Improving Knowledge (6)	Coming to an agreement (P11) Sharing (P7, P8) Working together (P3, P8, P10) Awareness of Responsibility (P3, P4, P15) Feeling Self-Confidence (P4, P9) Thinking more creative (P15)
	7c. "Grup projesi ile bireysel (tek başına) proje arasında tercih yapsam, ……. "	Group Project (12)	Both (P3, P9, P12)

RESEARCH QUESTIONS AND THEME TABLE (CONTINUED)

Research Questions	Interview Questions	Common Themes	Other Themes
	7g. "Gruba en büyük katkım……."	Helping to my friends (7) Doing web design (6) Researching (4) Peer support (2c)	Unifying what was done (P10)
	8. Sence grubunuzun 3 kişilik olması uygun mu? Değilse, sence bir grupta kaç öğrenci olmalı, neden?	3 is optimum (11)	2 (P15) 4 (P2, P12) 2 or 3 (P3)
	15. Grubunuzda bir lider var mıydı? Kim seçti bu lideri? Neden lider oldu?	There was a chef (Boyacılar, Turkuaz,x Menekşe) Peer support (2c)	There was no chef (Bacacılar→2-1, Gül→2-1)
b. How the learners perceive peer support?	5c. Bulduğunuz kaynakları birbirinizle paylaştınız mı?	Resources were shared (14)	Resources were not shared (P9)
	3e. Yardıma ihtiyacın olduğunda grup arkadaşlarından yardım alabildin mi? Proje süresince grup dışından bir arkadaşınla (gurubunuz dışında sınıftan başka birileri ile) hiç yardımlaştın mı?	Yes (14) Yes (12)	Sometimes (P9) No (P2, P6, P15)
	5b. Birlikte çalışmak için bir araya geldiniz mi?	Came together (15)	-

RESEARCH QUESTIONS AND THEME TABLE (CONTINUED)

Research Questions	Interview Questions	Common Themes	Other Themes
c. How the learners perceive the support of Science and Technology and Information Technologies teachers?	12. Bu projeyi yaparken öğretmenlerinden yardım aldın mı? (Aldıysa)Hangi konularda yardım aldın? (Ne için yardım aldın mesela?)	Resources (4) Support for Visual (4) Support for content (7) Web design (7)	Technical (P2)
d. How the learners perceive developing web pages on science subjects in the project-based learning environment? a. How the learners perceive project-based learning in Information Technologies lessons?	7b. "Projeyi bitirdiğimde kendimi…….hissettim; çünkü……."	Positive (9) Both (5)	Negative(P7, P12)
	7d. "Bence bilişim teknolojileri dersinde dönem projesi hazırlamak…….;çünkü…."	Positive (13)	Negative(P12) Both(P3)
	9. Sence yaptığınız proje daha sonra siz ya da başka öğrenciler tarafından kullanılabilir bir kaynak mıdır?	Useful	

RESEARCH QUESTIONS AND THEME TABLE (CONTINUED)

Research Questions	Interview Questions	Common Themes	Other Themes
b. How the learners perceive using technology to prepare a science project?	11. Biz Fen ve Teknoloji dersi konuları ile ilgili bir web sitesi yaptık, değil mi? Hazırladığınız projeyi düşünürsen, bilgisayarı Fen ve Teknoloji dersinde kullanmanın yararları konusunda ne söyleyebilirsin?	Search on the Internet (11) Visual (9) Documentation(4) Interactivity (4)	High Motivation (P8,P15) Communication Through Forum(P10) Rich Sources(multimedia) (P11) High Accessibility (P12) High Usability (P3) Easiness and Rapidness (P1) -No Contribution (P2)
	13. Sence bu proje …konusunu öğrenmene katkıda bulundu mu?	It contributed -	
c. How the learners perceive Information Technologies lessons supported with an asynchronous communication tool?	1. Proje çalışmanız süresince forumu kullandın mı? Hangi amaçla (neden) kullandın?	Use (10)	Do not use (P6, P12, P7) Do not use so much (P5, P11)
	2. Sence forum projenizi hazırlarken çalışmalarınıza katkıda bulundu mu? Nasıl katkıda bulundu?	Communicating with my friends(8) Communicating with my teachers (7)	It did not contribute (P3, P13)
	5a. Forum aracılığı ile haberleştiniz mi? Proje süresince haberleşebildiniz mi?	No(8)	Yes (P2, P10, P15de) (P2, P10 used forum from the beginning to the end) A little bit (P1, P3, P11) (not from the beginning to the end)