ICT Sufficiency in Cooperative Projects via the Internet

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Abstract: - The aim of this study is to determine the effects of cooperative projects implemented via the Internet on students' ICT skills. Within the scope of the study, it was attempted to determine the ICT skills frequently used in cooperative projects via the Internet, and it was also attempted to examine the level of students' and teachers' ICT skills. At the first stage of the study, the survey method was used to determine the basic ICT skills that might be needed by 8th grade students in their cooperative project works. It was also attempted to examine the existing level of the basic ICT skills of the 8th grade students. At the second stage of the study, the survey method was used to examine the level of the basic ICT skills of teachers. At the third stage of the study, the research population consisted of 58 students studying in the 8th grade at two different schools. The post-test control group experimental model was used to determine the effects of cooperative project works implemented via the Internet on students' ICT skills. Project groups were asked to implement one of two different projects. Two counselor teachers monitored projects and assisted students during the study. At the end of the training, the counselor teachers of the project groups evaluated the projects implemented. The data collection tools were practical examinations, which were used to measure the teachers' and students' ICT skills and the cooperative projects implemented via the Internet. At the end of the study, the skills required for students to have with respect to ICT were determined, and it was observed that students who were involved in projects were more successful compared to those not involved also in terms of the sub-components constituting ICT, just as in the use of ICT. Also in the study, it is shown that teachers have significant insufficiencies in terms of use of ICT. Results obtained from the study emphasize the necessity to create areas where students can use computers and the Internet actively, instead of explaining to them these technologies.

Key-Words: Computer, Internet, Multi Media, ICT, Collaborative Projects, Curriculum

1 Introduction

Rapid developments in information technologies are affecting education systems, and it makes it an obligation for students and teachers to gain new abilities to be a part of the information society. Education systems should educate students who are able to access information and use this information in line with their objectives, and to share and discuss their ideas and thoughts on the Internet. Ability to use the tools in information technologies, data collection, interpretation and using these data, and studying using the appropriate information technologies are among the skills necessary for students to have in an information society [1]. Only the students who have been able to gain these skills can keep up with the dimension of globalization in the field of education [2].

The challenge is how to integrate the information and communication technologies (ICT) into education systems. It is necessary to consider ICT standards set by a variety of organizations and institutions for students with respect to the matter. In spite of different approaches, the standards set by the British Department for Education and Skills (DfES), and by the International Society of Technology Education (ISTE) have some common aspects [3], [4]. Some of the commonalities of the basic ICT skills required for students between the 6th and the 8th grades are as follows:

- Being acquainted with and aware of the hardware and software that can be encountered in their daily lives. Ability to comprehend the basic operation of the software and hardware, and to determine and use the required technologies by understanding their relations among each other.
- Ability to access the information resources and conduct researches for solving world and daily life problems, to investigate the correctness of the information, to evaluate its appropriateness and to use this information as necessary.
- Being involved in individual and group works by making use of all kinds of communication technologies for solving the problems, and performing the applications and studies. The ability to deliver the results of the studies that have been carried out to the people within and out of the classrooms, and to design, develop and publish the products (such as web pages, videos and

presentations), which would be obtained at the end of the study.

When we examine the items described above, it can be seen that it is necessary for students to use ICT as a tool both in every field of life and in the teaching-learning process. Taylor (2004) found that, in order for the learning communities formed using new and different methods to be successful, use of ICT is an important tool [5]. One of the ways in which students could use ICT as a tool is the involvement in cooperative projects, where they can work on a common subject along with other students under the supervision of educators. The globalizing world today attaches importance on students' inter-cultural interaction, sharing and collaboration, and projects in this field are supported with a variety of programs by many countries and organizations. The Comenius and e-twinning programs implemented in the EU, the WorldLinks program of the World Bank, and UNESCO's ASPnet program are some examples. In addition to improvements in these fields, collaboration projects also aim to induce positive effects on students' individual characteristics such as assuming responsibility, learning about different cultures, and taking initiative through team works and cooperative works within the scope of project development. However, it is known that in order for students to be able to participate in such projects, they should not only be able to use the Internet for communication and information exchange, but also have competency in computer skills. While the teachers' role is to be counselor in collaboration projects, students use ICT to accomplish the required works, such as communicating with each other, sharing information and solving a problem within the aim of the project. According to the results of studies conducted by Kehm, Kastner, Maiworm, Richter, and Wenzel in 2004 on ICT used in Comenius projects or in products created at the end of the projects, 55% of the projects contained digital photography technologies, 45% Internet technologies, 42% digital videos, 40% CD technologies, 37% printed materials and 21% presentation programs [6]. Based on the studies taken as an example, it can be said that it would be worthwhile to integrate ICT into education in such a way to make students use these technologies actively and by making ICT associated with the other disciplines. Results of a variety of studies indicate that the use of ICT could facilitate applications such as cooperative works, which are difficult to perform in pedagogical terms [7].

The Turkish Ministry of National Education formed the computer curriculum's vision to educate students for the information society as "students who gained ICT literacy" and declared that computers should be used as a tool both in their daily lives and in the learning-teaching process [8]. However, different studies have shown that the Turkish ICT curriculum has some deficiencies in this field. Özdener and Öztok (2005) observed that the current curriculum was not sufficiently effective in providing students with the skills to use the Internet efficiently. The current curriculum also fails to provide basic skills such as using web-based search engines, downloading necessary texts and pictures for their own purposes, and similar deficiencies are also observed in communicating with other people via the Internet [9], [2].

These developments in information technologies not only affect the skills for students but also affect the necessary skills for teachers. Using ICT in lessons, inspiring and encouraging students to use ICT, designing an instructional environment to use ICT and cooperating with colleagues to discuss and share experiences are among the necessary ICT literacy skills declared by ISTE [10]. When ICT literacy skills are examined, it can be said teachers not only should have sufficient ICT skills to use and design the instructional process where students could use ICT, but they should also inspire students to use ICT. However, the process of integrating ICT into the education system is not as easy as compared to other technologies [11]. Lack of knowledge and perceiving ICT as a complex system causes teachers to have negative attitudes about ICT, which results in delays in integrating ICT into the education system. Manoucherhri found in his study that teachers' knowledge was insufficient about how to use ICT tools in the classroom in addition to a lack of general ICT knowledge [12]. Usluel and Demiraslan observed that the level of the teachers' ICT skills is the biggest factor affecting the integration of ICT into the teaching – learning process [13]. In order for ICT to be integrated, not only should students have sufficient ICT infrastructure, but teachers should also be equipped in terms of integration of ICT into other courses and of creating models for students. In this context, it is clear that learning the basic ICT skills through experience or participation in projects would be closely related to the computer literacy levels of teachers, the level of use of ICT in lessons, and the physical possibilities of the school [14].

The aim of this study is to determine the effects of cooperative projects implemented via the Internet on students' ICT skills. Within the scope of the study, it was attempted to determine the ICT skills frequently used in cooperative projects via the Internet, and it was also attempted to examine the level of students' and teachers' ICT skills.

2 Methods

2.1 Research Design and Population

At the first stage of the study, the survey method was used to determine the basic ICT skills that might be needed by 8th grade students in their cooperative project works. It was also attempted to examine the existing level of the basic ICT skills of the 8th grade students. While these skills were being determined, the Comenius, e - twinning and WorldLinks Projects' databases were examined and the most frequently ICT skills used in these cooperative projects via the Internet were established.

For the second stage of the study, the survey method was used to examine the level of the basic ICT skills of teachers, and the research population is represented in Table 1. The research population consisted of teachers who participated in ICT in-service teacher education at least once by the Ministry of National Education.

Table 1
Research Population for Teachers

		%	N	Total %	Total n
Gender	Male	46.6	76	100	163
	Female	53.4	87		
Branch	Primary	46.0	75		
	Secondary	54.0	88		
Degree	Associate	7.4	12		
	Bachelor	82.8	135		
	Master	9.8	16		

At the third stage of the study, the post-test control group experimental model was used to determine the effects of cooperative project works implemented via the Internet on students' ICT skills. The research population consisted of 58 students studying in the 8th grade at two different schools (Table 2). The results of the pre-test practical examination were used to specify the control and experimental groups in the study. Following the basic ICT education for both control and experimental groups, only the experimental groups were assigned cooperative project works for 13 weeks. The design of the cooperative project works used in the study were fundamentally based on database searches of ASPNet, Comenius, e – twinning and WorldLinks projects. Project groups were asked to implement one of two different projects. ICT teachers at the project schools were assigned as counselors to the project works, with each project school having one ICT teacher. These counselor teachers monitored projects and assisted students during the study. Project participation from each school was restricted with five students so project works could be monitored and assisted sufficiently. At the end of the training, the counselor teachers of the project groups evaluated the projects implemented. The experimental groups who were involved in the project works and the control group who was not involved in the project works were compared in line with the results of the post-test practical examination.

Table 2
Research Population for Students

	Project	School	Participation
Experimental Group	Project 1	School A	5
		School B	5
	Project 2	School A	5
		School B	5
Control Group	-	School A	38
		School B	

2.2 Data Collection

2.2.1. Practical Examination for Teachers

The practical examination of the teachers was aimed to evaluate the teachers' use of ICT skills. With this examination a total of 63 skills in six different categories such as, covering use of educational software, word processor, spreadsheet and presentation software, computer technologies and peripherals, using Internet technologies to access and share information and to communicate, were evaluated. These skills in the practical examination were determined in line with the general ICT requirements for teachers declared by the Turkish Ministry of Education in 2006.

The validity of the coverage of the practical examination was evaluated by six different teachers and the results indicated the following: the skills were represented by the questions, the amount of the questions was satisfactory, explanations and questions were clear and an overall consistency rate of 98.4 % was found. The KR-20 reliability of the examination was calculated to be 0.91 as a result of the item analyses carried out. Each skill in the practical examination was graded one point and the overall practical examination was graded over 63 points in total. Control lists were used to evaluate the practical examination, which was performed at the computer laboratory by two teachers.

2.2.2. Practical Examination for Students

The practical examination of the students was performed at the computer laboratory and aimed at measuring the groups' skills of using ICT. With this examination, a total of eight different skills covering word processor, spreadsheet and presentation software, computer technologies and peripherals, and using Internet technologies to access and share information and to

communicate were evaluated. The validity of the coverage of the practical examination was evaluated by five computer teachers teaching at primary schools, and a consistency rate of 88% was found.

2.2.3. Cooperative project

Another data collection tool used in this study was two cooperative projects implemented via the Internet. The cooperative project groups were formed with students from two different schools and the students included in these groups were enabled to perform their activities via the Internet. Through these projects, students' skills of using e-mail technology, accessing information through use of search engines, instant messaging, presentation, word processing, and spreadsheet software, as well as digital media devices, and CD and printer technologies were evaluated. While these skills were being determined, the Comenius and WorldLinks Projects' databases were closely examined, and the ICT frequently used in these projects were established.

2.3 Restrictions

Computer technologies were restricted with computer software, peripherals and office programs; and Internet technologies were restricted with e-mail and instant messaging programs and search engines.

3 Results

3.1 Pre Training Results

At the beginning of the training it was attempted to determine the ICT skills frequently used in cooperative projects implemented via the Internet. For this purpose, twenty cooperative projects were randomly selected from WorldLinks, Comenius and e-twinning databases, and these projects were examined to determine the ICT skills used in them (Table 3).

Table 3
The most frequently used ICT skills in the completed Comenius, WorldLinks and e - twinning projects

Project Names	Ages	Schools Involved	Word Processors	Spreadsheets	Presentation Program	Instant Messages	e - mail	CD-R Technologies	Digital Cameras	Printers - Scanners	Web Publishing	Picture Editing
Our way to save our planet	7-13	6	✓	✓	✓		✓				✓	
Telling lives	13-15	4	✓			✓		✓	✓			
Tourist guide of students' hometown	12-15	5			✓		✓		✓		✓	✓
Carbon footprints	7-11	2	✓		✓		✓			✓		
Children from other countries	10-12	8	✓		✓		✓					
Chocolate and chips	8-10	4		✓	✓		✓		✓			
Exchanging traveling buddies	9-12	3			✓		✓				✓	
Learning together	7-11	5	✓			✓	✓				✓	
D&L eMag	1-16	6			✓	✓			✓	✓	✓	
Twins newspaper	14-15	4			✓	✓	✓	✓		✓	✓	✓
Drawing our country	7-12	3	✓		✓		✓		✓	✓		✓
Together in Europe	8-15	4			✓	✓	✓		✓			✓
Good morning Europe	11-13	5	✓	✓		✓	✓	✓				
Learning and sharing	10-13	6	✓			✓	✓		✓			✓
Talking though time	10-11	2	✓		✓	✓	✓	✓	✓	✓		
Hands on Europe	13-14	2				✓		✓	✓		✓	
Let us be friends	9-11	3	✓				✓	✓		✓		
Join nature	13-15	4		✓	✓		✓	✓				
WetLands Projects	12-14	5	✓	✓					✓		✓	
School for all children	11-13	6	✓			✓	✓		✓	✓		

When Table 3 is examined, it can be found that basic skills such as use of the Internet for communication and sharing information, digital media devices, word processing, spreadsheet, and presentation programs are among the most used skills. In an attempt to specify the skills, a detailed list of the skills used in the cooperative projects via the Internet is provided in Table 4. The practical examination and projects used for data collection were prepared based on the skills of Table 4.

Table 4
Skills for collaboration projects via the Internet

1. Using Input / Output devices
2. Using Internet search engines
3. Having, using and managing an e – mail account
4. Managing folders and files (copy, paste, delete)

5. Using Printers
6. Using USB cameras and storage devices
7. Formatting text (color, font, size, styles)
8. Inserting pictures or external objects to a text
9. Inserting tables and using tables in a text
10. Converting data format (currency, date, number)
11. Working with formulas
12. Representing worksheet data in a chart
13. Formatting and editing layouts for a slide
14. Inserting pictures, audio and video to a slide
15. Using animation at slide transition
16. Copying data to USB storage devices
17. Using audio devices
18. Editing and formatting charts
19. Using CD ROM
20. Using instant message programs
21. Burning a data CD
22. Configuring a computer (time, desktop properties)
23. Copying data to floppy drives
24. Inserting symbols to a text
25. Copy – Cut – Paste in a text file
26. Inserting captions and page numbers to a text
27. Sorting data by ascending or descending order
28. Inserting figures to a slide
29. Using bookmarks in a web browser
30. Attaching a file to an e – mail
31. Using an address book in an account

The practical examination is held in attempt to evaluate use of ICT skills of students' in the 8th grade, and the results are provided in Fig. 1.

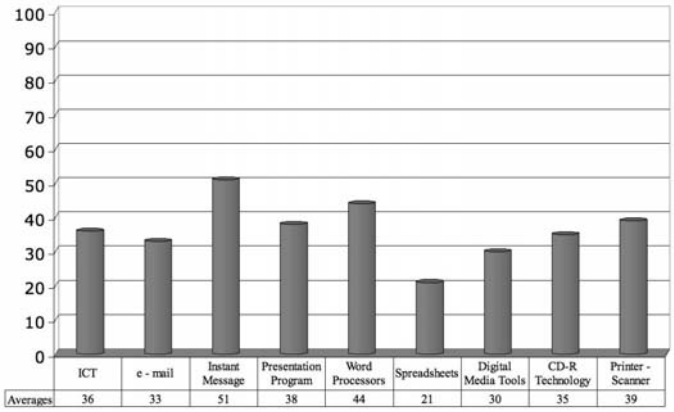

Fig. 1
Results of the Practical Examination

When Fig. 1 is examined, it can be seen that the use of the spreadsheet program has the lowest average with 21% and digital media tools with 30%, while the use of Instant Message programs have the highest average with 51%. According to Fig. 1 the overall average for use of ICT is 36%.

Prior to the training, the experimental and control group were compared in terms of ICT skills (Table 5) and sub-components constituting ICT (Table 6) using the Mann Whitney U test, and the results of the test indicated that the groups' prior knowledge was matched ($p>0.05$).

Table 5
Pre training results of both groups in terms of ICT

Project	N	Mean Rank	Sum of Ranks	U	p
Experimental Group	20	27.4	548.0	312.0	0.46
Control Group	38	21.6	820.8		

Table 6
Pre training results of both groups in terms of ICT sub-components

Skills	Projects	N	Mean Rank	Sum of Ranks	U	P
Word Processors	E	20	27.70	554.00	344.0	0.54
	C	38	30.45	1157.00		
Spreadsheets	E	20	26.13	522.50	312.5	0.25
	C	38	31.28	1188.50		
Presentation Programs	E	20	31.75	635.00	335.0	0.45
	C	38	28.32	1076.00		
Computer Technology	E	20	29.77	595.50	374.5	0.92
	C	38	29.36	1115.50		
Internet Technology	E	20	32.65	653.00	317.0	0.29
	C	38	27.84	1058.00		

E = Experimental Group, C = Control Group

Table 7 shows the results of the practical ICT examination for teachers.

Table 7
Results of the Practical Examination for Teachers

Practical Examination for Teachers	Number of Questions	Min	Max	Avg
Computer Technology	9	2	9	5.2
Internet Technology (Accessing Information and Communication)	8	2	8	6.0
Word Processors	14	5	14	10.9
Spreadsheets	14	6	13	9.4
Presentation Programs	13	6	13	9.1
Educational Software	5	0	2	1.4
Overall Success	63	23	57	42.2

Min = Minimum, Max = Maximum, Avg = Average

When Table 7 is examined, it can be seen that the average basic ICT skills for teachers is 42.2 over 63. While the highest average for teachers was word processors, the lowest average was educational software. In word processors, where the success average was the highest, it was observed that 80% of the teachers were unable to change line spacing and 55% were unable to set the page margins or add page numbers. With respect to computer technologies, 95% of the teachers were unable to use a scanner, 55% were unable to use a digital camera and 80% were unable to use projectors with a computer. With respect to presentation programs, it was also observed that 80% of the teachers were unable to perform basic operations required for preparing course materials, such as importing audio, video and setting slide transitions. In spreadsheet programs, it was seen that teachers have deficiencies in using formulas with 70% of the teachers unable to use the "Average" function and 95% the "If" function.

3.2 Post Training Results

The results of the practical examination given at the end of the study for determining the success of the students who were involved and not involved in the project works using ICT, are shown in Table 8, and are evaluated by the Mann Whitney U test.

Table 8
Comparison of the experimental and control groups

Project	N	Mean Rank	Sum of Ranks	U	p
Experimental Group	20	49.4	989.0	121	0.00
Control Group	38	25.6	972.8		

The results in Table 8 show that there is a significant difference in terms of the ability to use ICT in favor of the experimental group (U= 121, $p<0.05$). According to this result, when the students who were involved in the cooperative projects via the Internet are compared with those not involved in terms of the ability to use ICT, it can be found that there is a significant difference in favor of those who were involved in the projects.

The students who were involved in the project works were compared to those not involved in terms of not only ICT, but also the sub-components constituting ICT (Table 9).

Table 9
Mann Whitney U Test Results for both working groups

Skills	Projects	N	Mean Rank	Sum of Ranks	U	P
Word Processors	E	20	34.22	684.50	285.5	0.11
	C	38	27.01	1026.50		
Spreadsheets	E	20	37.15	743.00	227	0.01
	C	38	25.47	968.00		
Presentation Programs	E	20	40.97	819.50	150.5	0.00
	C	38	23.46	891.50		
Computer Technology	E	20	39.22	784.50	185.5	0.00
	C	38	24.38	926.50		
Internet Technology	E	20	45.28	905.50	64.5	0.00
	C	38	21.20	805.50		

E = Experimental Group, C = Control Group

Table 9 indicates that, when the experimental and control groups are compared in terms of the sub-components of ICT, it can be observed that there is a significant difference in favor of the group who was involved in project works in all headings except for word processors.

The students who were involved and not involved in project works were also compared in terms of eight sub-headings of ICT based on average scores (Fig. 2). When Fig. 2 is examined, it can be observed that the experimental and control groups both received the lowest scores from the spreadsheet program, and both received the highest score from the instant messaging program. While there is no significant difference between the two groups in terms of the skills of using spreadsheets and instant messaging programs, there are differences in favor of the groups who were involved in project works in the other fields.

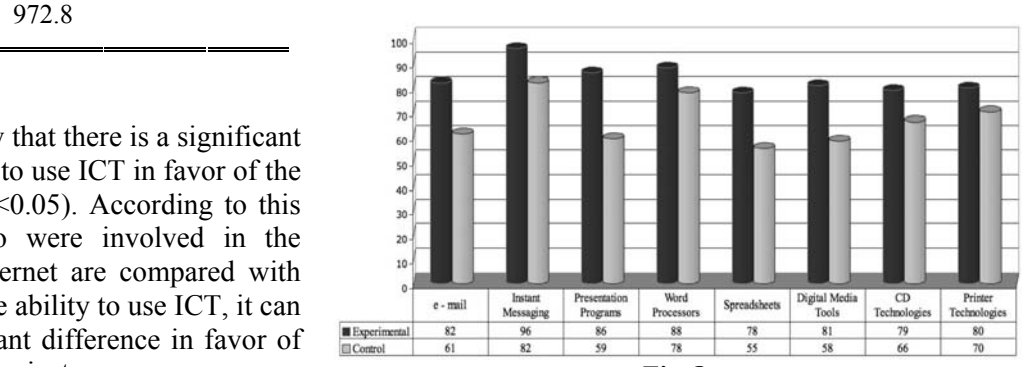

Fig. 2
Comparison of the students who were involved and not involved in the projects in terms of eight ICT sub-headings

4 Conclusion

In this study, the basic skill level of ICT use of 8th grade students is determined. When we examine the pre-test results, it is observed that not only the level of basic ICT usage of the 8th grade students but also the levels of ICT sub-components are not sufficient even though students have studied computer lessons for five years. The current curriculum fails to provide basic skills such as using web-based search engines, downloading necessary texts and pictures for use in word processor and presentations, and similar deficiencies are also observed in communication with other people via the Internet. It was also observed that students were not capable of studying alone nor with other students in the project works, nor were they capable of finding solutions for problems that challenged them. Özdener and Öztok observed similar results in their study in 2005 [9].

The ICT proficiencies required for the students to be involved in cooperative projects via the Internet were determined. While these skills for the students' projects were determined, accessing information, communicating, cooperative working and inter-cultural interaction were set as the goals of the project works. It is important to note that the students gain the ability to access information in the shortest time possible using the Internet, make use of the information correctly with the appropriate computer software, and share the information as necessary. It is necessary that the students who wish to participate in such cooperative projects via the Internet have these skills, even if they are at a basic level. This concept is supported by a study conducted by Kehm, Kastner, Maiworm, Richter, and Wenzel in 2004 on information and communication technologies used in Comenius projects or in products created by the end of the projects [6]. Consequently, these students that would participate in such projects should be given education on information technologies, which provide the means to access the correct information, and to process, produce and publish the information. Öztok and Özdener (2007) found that students have considerable deficiencies in implementing cooperative projects via the Internet without the basic ICT infrastructure and computers can be used as a tool for other disciplines upon provision of students with the basic ICT skills [2]. Based on this concept, it can be said that the most important factor that affects learning is not ICT itself, but the method with which it is integrated into the learning process. This opinion is supported by a study carried out by Mendell, Sorge and Russell in 2002 [15].

When the results of the practical examination for teachers are examined, it is shown that teachers have significant insufficiencies. According to the results of the study, teachers could not use ICT tools to prepare an instructional material nor plan a lesson where students could use ICT. Furthermore, studies show that some teachers still have low self-confidence about connecting to the Internet in the classroom even though they have participated in technology workshops [16]. In addition, Jung (2005) declared in his study that teachers demand more practical workshops about integrating ICT into education [17]. However, according to the general requirements for teachers declared by the Turkish Ministry of Education, teachers should not only be an inspiring model about using ICT, but also design a learning environment that students could use ICT in.

As for the educational software applications, it is important to note that one of the lowest scores for the teachers was the educational software itself. It was observed that teachers could not run an educational CD or install it to a computer, nor could any of the teachers compare two educational softwares in terms of suitability for users, ease of use, user interface and quality of media. The study carried out by Özdener and İmamoğlu in 2005 indicated that teachers did not have adequate information on educational software that could be used during the education process and that it was, perhaps, for that reason that they were unable to use the software correctly and adequately [18].

Also in this study, the experimental and control groups were compared in terms of ICT skills in an attempt to determine the effects of cooperative projects on the integration of computer and Internet technologies into education. It was found that the students who were involved in cooperative projects were more successful compared to those not involved. This result supports studies conducted by Harrison (1999), Dooling (2000), Asan and Haliloglu (2005), Özdener and Bıyık (2007) [19], [20], [21], [22]. Based on this result, it can be said that, in addition to theoretical lessons, the necessary circumstances where students would be able to use these skills should also be provided in the integration of ICT into education. Hayes' study (2007) stated that the most important factor in the integration of ICT into education was the design of the students' learning experience, and that it was necessary to increase the possibility of using ICT in the education process [23]. It is also known that involvement of the students in the cooperative projects makes positive contributions to students' ICT use [24].

Students who were involved and not involved in cooperative projects were also compared in the sub-components constituting ICT. Results indicate that students involved in the projects were more successful in terms of not only the use of ICT but also the sub-components constituting ICT, and that there was no significant difference only in the use of word processors.

The reason why there was no significant difference between the groups in terms of word processors can be that the students learn the word processing programs not only during their computer lessons, but they actively use this kind of program in computer and other courses as well. Another ICT sub-component in which both groups exhibited a success level close to each other was the instant messaging programs. The reason why both groups had almost similar success in terms of the instant messaging programs can be that this sub-component is very popular among students and is one of the most widely used programs. The reason why the groups that were involved in projects including spreadsheets received low scores can be that spreadsheets did not have the adequate areas of use and consequently the students did not use this program frequently. The same applies for CD technologies. In this case, it can be said that the projects should be developed in line with planned educations, and they should be determined as a result of a joint study to be carried out with educators from different disciplines. If the fact that the skills, in which students are the most successful, are the ones that they frequently use in their daily lives is taken into consideration, it can be said that it is necessary to create areas where students could use computers and the Internet actively. When considered in terms of education, ICT is rather a process, instead of being a technological tool.

References:

[1] H. Tor, O. Erden, A Study on primary education students' level of utilization of information technologies, *Turkish Online Journal of Educational Technology*, Vol. 3, No.1, 2004.

[2] M.Öztok, N.Özdener, Information and communication technologies in collaboration projects via the Internet, *International Journal Of Social Sciences*, Vol. 2, No. 3, 2007.

[3] Department Of Education and Skills (DFES), National Curriculum Online, Available: http://www.nc.uk.net.

[4] International Society for Technology Education (ISTE), National Educational Technology Standards For Students (NETS) published by ISTE, Washington DC,Available:http://www.iste.org/inhouse/nets/cnets/index.html

[5] D.R. Taylor, Developing powerful learning communities using technology, *AACTE Briefs*, Vol. 21, No.14, 2000, pp 4-5.

[6] B. M. Kehm, H. Kastner, F. Maiworm, S. Richter and H. Wenzel, Interim evaluation of the action COMENIUS of the SOCRATES II programme in Germany final report, *National Evaluation of the Action Comenius of the SOCRATES II Programme in Germany*, Germany, 2006

[7] M.D. Roblyer, J. Edwards, M. A. Havriluk, *Integrating educational technology into teaching (4th Ed.),* Upper Saddle River, NJ: Prentice Hall, 2004

[8] Curriculum of computer lesson from 4th to 8th grade, *MEB Journal of Communiques* 2492, Ankara, Turkey, 1998, pp 1030-1046

[9] N. Özdener and M. Öztok (2005), Comparison of the Turkish and British Curriculums in terms of Computer Literacy. *National Education Journal. Vol. 33, No.167.* Available: http://yayim.meb.gov.tr/dergiler/167/index3-oztok.htm

[10] International Society for English in Education (ISTE), *NETS-Standards for Teachers*, Published by ISTE, Washington DC, 2000.

[11] D.Hawkridge, *New Information Technology in Education*, Croom Helm. London, England, 1983

[12] A.Manoucherhri, Computers and school mathematics reform: Implications for mathematics teacher education, *Journal of Computers in Mathematics and Science Teaching*, Vol.18, No 1, 1999, pp 31–48.

[13] Y. K. Usluel and Y. Demiraslan, Teachers and Integrating ICT into The Teaching - Learning Process, *The Turkish Online Journal of Educational Technology,* Vol. 4, No. 3, 2005. Available: http://www.tojet.net/articles/4315.htm

[14] R. Sutherland, Designs for learning: ICT and knowledge in the classroom, *Computers & Education*, vol. 43, 2004, pp 5-16.

[15] S. Mendell, D.H. Sorge, J.D. Russell, Tips for technology integration, *TechTrends*, Vol. 46, No.5, 2002, pp 39-43.

[16] KMEC, Educational Informatization Evaluation Report: Inservice teacher training evaluation. Internal report: Korea Multimedia Education Center, 1998

[17] I. Jung, ICT-Pedagogy Integration in Teacher Training: Application Cases Worldwide. *Educational Technology & Society*, Vol. 8, No. 2, 2005, 94-101.

[18] N. Özdener and C. İmamoğlu, Evaluating The Activities of In Service Courses of M.E.B. in Terms of The Use of Educational Software, 4th Congress of International Educational Technologies, University of Sakarya, September 2005.

[19] C. R. Harrison, Spinning a web around forensic science and senior biology, *Australian Science Teachers Journal*, Vol. 45, No.8, 1999.

[20] J. O. Dooling, What students want to learn about computers?, *Educational Leadership*, Vol. 58, No. 2, 2000.

[21] A. Asan, Z. Haliloglu, Implementing project based learning in computer classroom, *Turkish Online Journal of Educational Technology*, Vol. 4, No.3, 2005.

[22] N. Özdener, R. Bıyık, Development of a new curriculum for computer education and comparison with the current curriculum of the Turkish Ministry of national education, *Turkish Online Journal of Educational Technology*, Vol. 6, No.3, 2007.
[23] N.A. Debra Hayes, ICT and learning: lessons from Australian classrooms, *Computers & Education*, Vol. 49, 2007, pp 385–395.
[24] M. Riel, K. Fulton, The role of technology in supporting learning communities, *Phi Delta Kappan*, Vol. 82, 2001.

Appendix A

Project Plan - Beautiful Istanbul	
Subject	Carrying out a joint project using a variety of ICT
Scenario	Students take photographs in different places of Istanbul, and information relevant to these areas is collected via the Internet. This information is shared with other students and a joint report is prepared and printed out. The work is then transformed into a presentation and is copied onto a CD-ROM along with the report.
Start / End Date	03-20-2006 / 05-19-2006
ICT to be used	e-mail, instant messaging, word processor, presentation program, digital media devices, printer and CD technologies.
Products	Presentations and a report relating to the subject and a CD to be prepared by the project group.
Process	**Things To Do**
Students meet each other	The application teacher provides the students with the e-mail addresses of other students that constitute the working group.
Selection of the study subjects	Students communicate with each other using instant messaging programs and each student selects his/her subject.
Data collection	Students search information about the areas related to their own project on the Internet.
Photographing	Students take photographs of the area and transfer them to their computers.
Information sharing and communication	Students bring their completed works together.
Reports	Students prepare a report containing the information on which they worked.
Printing	Students print the report out.
Preparation of Presentations	Students prepare a unified presentation.
Recording on CD-ROM	The prepared presentation is recorded on a CD-ROM.

Appendix B

Project Plan – Knowing Each Other	
Subject	Carrying out a joint project using a variety of ICT
Scenario	Students prepare a survey and collect data of other students relating to the survey. Students share their results after they input their data to a spreadsheet via e- mail. This data is converted to a chart and students write an article about the results. The charts and report are printed.
Start / End Date	03-20-2006 / 05-19-2006
ICT to be used	e-mail, instant messaging, word processor, spreadsheet, digital media devices, printer and CD technologies.
Products	Charts and a report relating to the subject and a CD to be prepared by the project group.
Process	**Things To Do**
Students meet each other	The application teacher provides the students with the e-mail addresses of other students that constitute the working group.
Determining of the survey	Students communicate with each other using instant messaging programs and prepare a survey together.
Data collection	Students collect information about their schoolmates related to their project.
Transferring data	Students transfer the data to a spreadsheet program.
Information sharing and communication	Students bring their completed works together.
Preparing charts	Students prepare a chart containing the information on which they worked.
Reports	Students prepare a unified report containing the information on which they worked and print it out.
Recording on CD-ROM	The prepared presentation is recorded on a CD-ROM.