Integration of Information and Communication Technologies into the Education Process: 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 also attempted to determine the ICT skills frequently used by 8th grade students in their cooperative projects implemented via the Internet. The research population of the study, during which the post-test control group experimental model was used, consisted of 58 students studying in the 8th grade at two different schools. Following the basic ICT education, the experimental groups were assigned cooperative project works, and the control groups were given only a basic ICT education. At the end of the training, the students who were involved and not involved in cooperative projects were compared in terms of ICT skills through a practical examination. The data collection tools used in the study consisted of the practical examination given before the study to measure the groups' ICT skills, and the cooperative projects implemented via the Internet. Eight different skills covering e-mail technology, instant messaging programs, presentation programs, word processors, spreadsheets, digital media tools, CD technology and printer technology were evaluted with the practical examination and collaborative projects. 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 the 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 science and technology make it an obligation for the education systems to 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 via the Internet. Ability to use the tools in the 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.

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 of Education and Skills (DfES), and by the International Society of Technology Education (ISTE) have some common aspects [2], [3]. Some of the common aspects 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, 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) stated that, in order for the learning communities formed using new and different methods to be successful, use of ICT is an important tool [4]. 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. According to the results of the 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 [5]. 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 the applications such as cooperative works, which are difficult to perform in pedagogical terms [6]. However, students need to have sufficient ICT infrastructure, and teachers should be equipped in terms of integration of ICT into other courses and of creating models for students, in order for computers to be used as a tool. In this context, it is obvious that learning the basic ICT skills through experience or participating 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 [7].

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 also attempted to determine the ICT skills frequently used in cooperative projects implemented via the Internet.

2 Methods

2.1 Research Design and Population
The research population of the study, during which the post-test control group experimental model was used,

consisted of 58 students studying in the 8th grade at two different schools. Following the basic ICT education, the experimental groups were assigned cooperative project works (Appendix A,B), and the control groups were only given theoretical education covering only ICT education (Table 1). At the end of the training, the students who were involved and not involved in cooperative projects were compared in terms of ICT skills through a practical examination. The Mann Whitney U test was used for group comparisons.

Table 1
Reserch Population

	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	40
		School B	

2.2 Data Collection
One of the data collection tools used in the study was the practical examination, which 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.

Another data collection tool used in this study were the 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

Prior to the training, the experimental and control group were compared in terms of skills of using ICT (Table 2) and sub-components constituting ICT (Table 3) using the Mann Whitney U test, and the results of the test indicated that the groups were matched (p>0,05).

Table 2
Pre training results of both working 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 3
Pre training results of both working 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

It was attempted to determine the ICT skills frequently used in cooperative projects implemented via the Internet. For this purpose, 10 cooperative projects from among those used in programs such as WorldLinks, Comenius and e-twinning to date were randomly selected, and these projects were examined by 5 different teachers to determine the ICT skills used in them (Table 4). When

Table 4 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. 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

Using Input / Output devices
Using Internet search engines
Having, using and managing an e – mail account
Managing folders and files (copy, paste and delete)
Using Printers
Using USB cameras and storage devices
Formatting text (color, font, size, styles)
Inserting pictures or external objects to a text
Inserting tables and using tables in a text
Converting data format (currency, date, number)
Working with formulas
Representing worksheet data in a chart
Formatting and editing layouts for a slide
Inserting pictures, audio and video to a slide
Using animation at slide transition
Copying data to USB storage devices
Using audio devices
Editing and formatting charts
Using CD ROM
Using instant message programs
Burning a data CD
Configuring a computer (time, desktop properties)
Copying data to floppy drives
Inserting symbols to a text
Copy – Cut – Paste in a text file
Inserting captions and page numbers to a text
Sorting data by ascending or descending order
Inserting figures to a slide
Using bookmarks in a web browser
Attaching a file to an e – mail
Using an address book in an account

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, by use of the Mann- Whitney U test, are provided in Table 5.

Table 5
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 of Table 5 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 6).

Table 6
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 6 indicates that, when the experimental and control groups are compared in terms of the sub-components of ICT, it can be seen 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. 1). When Fig.1 is examined, it can be seen that the experimental and control groups both received the lowest scores from the spreadsheet program, and both received the highest score from 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 group who was involved in project works in the other fields.
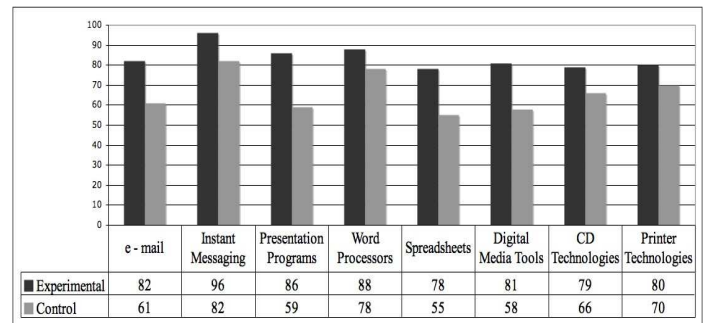

Fig. 1
Comparison of the students who were
involved and not involved in the projects in
terms of eight ICT sub-headings

4 Conclusion

To begin the training, the ICT proficiencies required for the students to be involved in cooperative projects via the Internet were determined. While the skills were being determined, facilitation of accessing information, communication and cooperative working and cultural globalization through the use of computers as an information and communication tool were focused. 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 [5]. 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 [15]. 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 [8].

In the 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), Özdener and Bıyık (2007), Asan and Haliloglu [9], [10], [11], [12]. 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 [13]. It is also known that involvement of the students in the cooperative projects makes positive contributions to students' ICT use [14].

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 processor. The reason why there was no significant difference between the groups in terms of the 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 programs 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.

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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.