

# Information Technologies, Computer Use and Digital Divide in Education

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**Abstract:** *It is now widely acknowledged that the Internet has changed the shape, time, and location of learning. The Internet facilitates learning from any location at any time, transforming the way education is conducted. Hence, education is also no longer limited to four walls, one blackboard and set hours. However, the use of computers in education brings about a digital divide increasing inequalities in access to education, technology and information. This study analyzes the inequalities resulting from technology and the social structure formed by these inequalities by using survey data on the habit of computer use. The main hypothesis of the study is that the use of computer in education results in a differentiation regarding the use of computers and attitudes towards new technologies. Besides, this study aims at examining the question of whether there is a divide between rural and city schools in terms of access and the use of computers. The findings indicate that there is digital divide created not only by the habit of computer use but also shaped by the content of the habit and opportunities of computer use in education.*

**Keywords:** *Education, information technologies, Internet, digital divide*

## **Bilgi Teknolojileri, Bilgisayar Kullanımı ve Eğitimde Dijital Bölünme**

**Özet:** *İnternetin eğitim-öğretimin şeklini, zamanını ve mekanını dönüştürdüğü günümüzde yaygın olarak kabul edilmektedir. İnternet; istenilen zamanda ve yerde öğrenmenin önünü açarak, eğitimin yapılış şeklini değiştirmiştir. Eğitim artık dört duvar, bir kara tahta ve zil saatine göre formatlanmamaktadır. Ancak, bu gelişmeler eğitimde bir dijital bölünmeye ve eğitime, teknolojiye ve bilgiye erişimde eşitsizliğe yol açmıştır. Çalışma, bir alan araştırması bulgularına dayanarak, teknoloji temelli eşitsizliklerle, bu eşitsizliklerin eğitsel ve toplumsal sonuçlarını irdelemeyi amaçlamaktadır. Ayrıca, eğitimde bilgisayar kullanımının teknolojiye erişimde ve teknolojiye karşı tutumlarda farklılaşmayı artırdığı bu çalışmanın temel tezini*

*oluşturmaktadır. Bilgisayar kullanımının kent ve kırsal arasında bir kırılmaya yol açıp açmadığını da sorgulanmaktadır. Bulgular, bilgisayar kullanabilme yeterliliğinden ve bilgisayara ulaşımdan kaynaklanan bir dijital kırılmanın varlığına işaret etmektedir.*

**Anahtar Kelimeler:** Eğitim, bilgi teknolojileri, İnternet, dijital kırılma

## Introduction

While discussing the new forms of globalization, network identity and social change in the context of transformation in time and space in his book, the Rise of the Network Society, Manuel Castells ignores the real spaces of the future and the deprivation of the passive participants in these networks. In this context, information can be seen as a matter of survival for everybody. Information gives the opportunity for required exchanges between environment and people. Living actively means living with information. Although communication and control are seen as a part of social life, they, in fact, are also a part of spiritual life. The vital importance of information is such that it could be defined as a condition for human existence. Taking into consideration that the most common term used to define contemporary societies is "information society". How information is produced, disseminated and shared is more important than ever before.

In this study inequalities resulting from access to and use of technology and the results of these inequalities are analyzed by using the habit of computer use in education. The data were collected from the elementary schools in Isparta and the habit of computer use is evaluated accordingly. Social meaning of the divide formed by computer use habits are determined by the functional use of computer. The main hypothesis of the study is that the use of computer in education creates a differentiation regarding computer use and attitudes towards technology. This divide is created not only by the habit of computer use but also shaped by the content of the habit and opportunity of computer use in education. In recent years, it has been acknowledged that the İnternet has changed the direction, time, and location of learning (Moore, 1993; Nachmias et al., 1999). Moreover, the typical class is also no longer limited to four walls, one black board and set hours since the İnternet facilitates learning from any location at any time transforming gradually the way education is conducted. Thus, the use of computers in education shapes the dimension of digital divide. This, in return, results in social inequalities regarding access to information. Therefore, this study aims at examining the divide between rural and city schools with regard to the habit of computer use.

## Globalization, Information Technologies and the New Meaning of Education

Globalization has resulted in rapid changes in many aspects of social and economic life. One of them is the institutional change. Education, as a key player in these changes, has also been affected by this institutional change. As a result of this, it has become vital for educational institutions to reorganize themselves and to use Information Technologies effectively.

Many changes have taken place in the phase of producing, sharing and transferring of Information in today's information society. These changes emphasize not only the importance of quantitative but also qualitative accumulation. Old mass media tools were utilized to transfer messages to a homogenous group of audience. However computer and other related mass media tools allow senders and receivers to disassociate from each other. This enables us to choose the most processed and selected information according to our individual requirements (Krishan, 1992).

While the rapid results of globalization connect us to other societies, they also result in changes not controlled by local ties. The changes taking place in the production, consumption and working habits and similar perceptions of welfare and confidence enhance the interaction of the similar habits. Today, computers are used in each area of our life and it affects our method of working, consumption habits and even private relationships (adult, matchmaking and chat sites etc.). Whether or not we adopt our education programmes to these changes will determine the new position of next generations in the concept of a global village.

The fact that internet makes physical perceptions invisible, causes doubts about the privacy of the information sent, received and shared. The dimensions of computer use are far beyond everyday use. In this context, people having the opportunity to access technology have also the ability to decode or affect communication in the Internet. In this framework, this study aims at evaluating the interaction among human capital, educational institutions and internet as a key player in the production and exchange of information. Then, the transformation in educational institutions is discussed in the context of the opportunity to access to new technologies and their use.

### **Information and Educational Technologies and the Necessity of Change in the Institutional Structure**

Technology is the main support tool for students in education nowadays. The shift from teacher-centered instruction to student-centered instruction makes the role, activities, attitudes, reflections of students more important regarding the effectiveness of technology in instruction. Computers are the main technology support as a tool for effective learning and teaching process. Computer based instruction and computer programs provide much more facilities and support students' educational life. Computer is a mechanism for education and affect all global, cultural, and economic life standards as well (İşman et. al., 2004).

Institutional structure changes like everything. Educational institutions have links with all institutional structures varying from a small institution to the state. In this manner, educational institutions have always been a matter of discussion, formally or informally. In all societies, education is accepted as a solution for many social problems.

Both traditional and modern education institutions determine the role of education in social change with their different approaches. The most important difference can be said to be the individual oriented education seen in the traditional societies. Formerly, the source of information was human. This changed with the rational thought of industrial modernity which made mass access to information affordable by coming of the use of books and other tools. Today this process has gained new forms with the existence of tools enhancing individual basis. New forms of information sources (computers, Internet etc.) not only changed the structural characteristic of educational institutions but also made radical changes in human capital. Complex technologies gained a hold over the capital-intensive organization of economic life and the collective social imagination of Northwestern societies during the late twentieth century in a time of cold global warfare. By the early twenty-first century, high-speed cybernetic networks of fascinating and fearful information have become the stuff of everyday life. Whether in the form of wireless cell phone data uploads, 24/7 instant messaging, digital surveillance cams, laser-guided killing machines, ATM dispersals of credit, emotionally charged interactions with television, or any of a wide range of other human-machine interfaces, computational exchanges between energetic humans and coded-informational commands today routinely captivate our senses and thoughts, reorganizing what we remember and what we forget (Ortega, 2000).

Accounting for young population and the need for improvement; it is essential for Turkey to develop a policy on Information Technologies. In order to achieve this, planning for the improvement of the quality of the human capital and understanding the fact that the nation state has undergone many radical changes is important. Such an approach would give policy makers some political clues about how to plan for the enhancement of human capital. Yet, today it is not easy to develop clear and definite plans for the period after the nation states. The nation state, providing sovereign territory for a particular nation, has been given new roles because of the changes taking place in the world for the last three decades. Ambiguities are widespread in today's uncontrolled global world. This produces some additional problems for nation states and leaves them unprotected in the global market. However, the existence of new tools at the disposal of policy makers enables them to deal with ambiguities of the global world and benefit from these new tools to improve the capacity of a nation's human capital. Of course, economically strong nations are in an advantageous position here. Yet, this new global environment and the domination of neo-liberal policies result in the exploitation of human capital without regard to economic strength. In this new era, the necessity to understand the dynamics behind the change and the definition of new roles will continue. Competitiveness and quality are presented as the main components of the determination and improvement of the quality of human capital and the cultural differences of the societies are disregarded. In this process, international organizations and market actors seem to play a particularly important role.

It is the common goal of every nation to have human resources which could meet the requirements of the social, economic, politic and cultural needs of the globalization. Policies related to human resources have the same goals in the global world. Nations should adopt educational policies which prepare their human capital to take part in the process of change creatively while they adopt to legal regulations and structural transformations.

### **Access to Computers and the Internet, Education and Digital Divide**

A proliferation of technology use in all aspects of our life indicates that information and technology play major roles in the continuation and transformation of today's societies. Learning and education is no exception and the way information and technology interacts also transforms the traditional methods of education. More than 30 years ago, Daniel Bell was optimistic about the transition towards an information society and he argued that the transformation into a post-Industrial society would be provided by information and knowledge.

There are many ways in which social inequality shapes Internet access and use. Hence, the digital divide is a multilevel and multidimensional social phenomenon, affected by social inequalities at the global, national, community, and individual levels. These multiple digital divides vary according to the characteristics of countries, such as the level of economic development and the level of internet access. Data from the International Telecommunication Union (ITU) shows that school enrollment; educational attainment, newspaper readership, and language diversity are important indicators of knowledge-based barriers to Internet access and use (International Telecommunication Union 2003). The digital divide also varies according to different characteristics of individuals, such as socioeconomic status, gender, age, race, and ethnicity (Chen and Wellman, 2005).

As the tools used to access to the Information is individually functional, it is necessary for educational institutions and schools, its organizational structure, to rearrange their roles. In 2004, the subject of the human development report of UNDP was Information and Communication Technologies. Information and Communication Technologies (ICT) have a vital role to play in sustainable human development. ICTs may have side effects like every new technology and method. These adverse effects may involve the violation of private life, unemployment in short term, the divide between genders and regions. The report also notes that the risks of slowing down the access of people to Information.

According to Digital Access Index of International Communication Union, Countries are classified into four digital access categories. Turkey ranked 5th in medium access category and it also ranked 72nd among 180 countries with its 0.48 point (UNDP, 2004). Another report taken into consideration in international comparisons is the report of World Economic

Forum 2002/2003. 84 countries were classified according to their readiness to become an Information Society. This report gave Turkey's readiness for the networked world 3.57 point and Turkey advanced to 50th rank among 84 countries (UNDP, 2004). According to data findings of Household Information Technologies use research carried out by the Turkish Statistical Institute, the computer use and ownership in Turkey is low. There are significant differences between males and females in accessing to Information Technologies. There are also differences between age groups. One in ten houses in Turkey has a computer and the houses with an Internet connection are approximately 7%. The rate of males using computer is two-fold compared to females. This difference increases in Internet use and the rate of males using Internet is two and half fold compared to females.

As it is defined by Roblyer (2003: 6) "Educational technology is a combination of the processes and tools in addressing educational needs and problems, with an emphasis on applying the most current tools: computers and their related technologies." Hence, educational technology is viewed to have two components as processes that are simply the learning activities necessary to attain a learning objective and resources to enhance learning. Smaldino, Russell, Heinich and Molenda (2005: 21) stresses that most people think of technology as products like computers, CD players, the Space Shuttle, etc. and they state that "This is one type of technology, which we will refer to as instructional technology when it is used for instructional purposes." This study concentrates on the resources component of educational technology with an equal emphasis on all four categories of instructional technology used in science lessons: Classical technology, modern technology, computer technology and laboratory technology.

Rapid technological developments have its impact on education. It can be said that the practice of teaching science has been more traditional than any other curriculum area, but technological developments have affected science education also. There are some issues and problems in science education. The technological developments could help science teachers to overcome these problems (İşman, 2007).

### **Research Methodology**

This study was conducted with 6<sup>th</sup> and 7<sup>th</sup> grade students at Ülkü, Gülbirlik, Sarıdris Elementary Schools and TED College in Isparta in the school year of 2006/2007. In this study 155 students, chosen randomly, were interviewed. Established in 2001, TED Isparta College is a private school. Its students come from families with a high level of income.

Ülkü Primary School is located in the Isparta City centre and its students are the children of families with a high level of income as well. It was established in 1930 and has been a Curriculum Laboratory School since 1993 under The National Education Development Project signed between

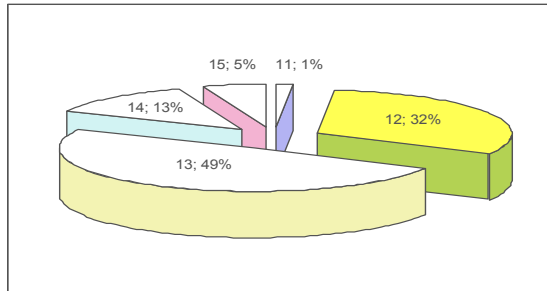
Turkey and the World Bank in 1990. The aim of this Project was to follow the changes taking place and to transfer them to students.

On the other hand, Gülbirlik Primary School is located in the periphery of Isparta. It was established in 1998 and most of its students come from families with a low level of income. 241 students were enrolled at this school in the school year of 2006/2007. It has an IT classroom and an IT teacher employed on a contractual basis. Sariidris Primary School is located in Sariidris town in the district of Eğirdir. In the selection of sample, such factors as social and economic status along with location were utilized.

Sariidris Primary School was established in 1932. Until 1940 its students were graduated from the 3th grade. After 1940, it became a 5-year elementary school. Then, the school had been a small, 3-classroom school. In the 1960's Sariidris village became a municipality and as a result of this its population increased rapidly. To meet this increase, in the school year of 1991–1992 a new primary school was established. This new school consists of 15 classrooms. 5 branch teachers, 9 class teachers and 1 teacher working on a contractual basis are the personnel of Sariidris Primary School.

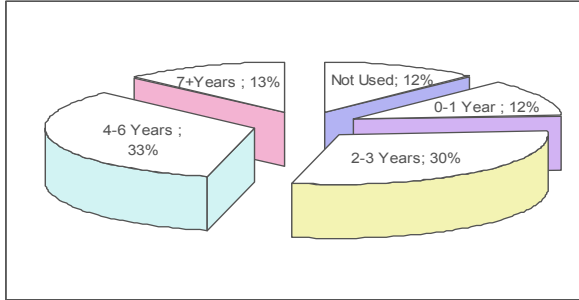
### Research Findings

The sample group included students in different proportions from the elementary schools in the province of Isparta. 155 students from 6<sup>th</sup> and 7<sup>th</sup> grades were interviewed. 38% of student sample was drawn from Ülkü Primary School, 27%, from Gülbirlik Primary School, 25%, from TED Isparta College, and 10% from Sariidris Primary School.



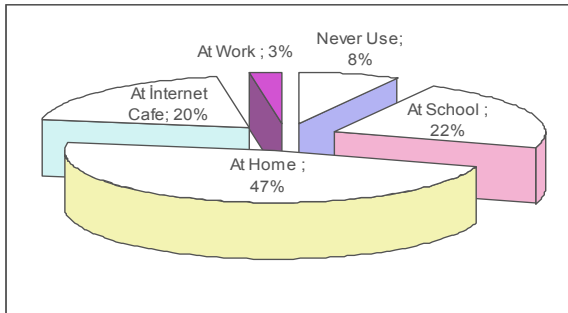
Graphic 1: Distribution of Students According to Age

43% of participants were female and 57% of them were male. The age distribution of the sample is shown in Graphic 1 above. The ages of students ranged from 11 to 13 years old. 49% of participants were 13 years old, 32% of them were 12 years old, 13% of them were 14 years old, 5% of them were 15 years old and 1% of them were 11 years old.



Graphic 2. The Number of Years Students Have Used Computer

59% of sample group pointed out that they had a computer at home whereas only 35% of them said that they had Internet connection. As seen in Graphic 2 above, 12% of them said that they used it for 0 to 1 years while 12% of them expressed that they had never used a computer. 33% of participants said that they used computer for 4 to 6 years while 30% of them said that they used it for 2 to 3 years. 13% of them expressed that they used it for 7 years or more. The average age of starting to use computer is 7,5.



Graphic 3. Place Where Students Used a Computer for the First Time

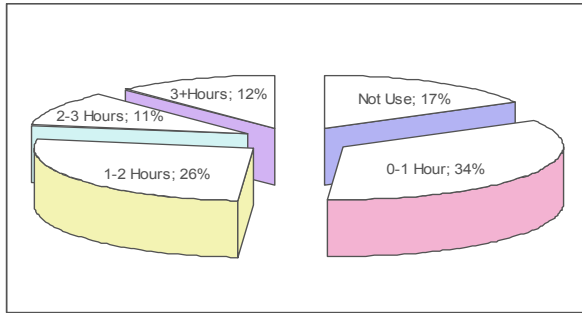
When the place where the first computer experience gained is investigated, 47,4% participants expressed that they used computer at home for the first time as shown in Graphic 3 above. 22,1% of them expressed that they used it at school for the first time whereas 20,1% of participants pointed out that they used computer at Internet cafes. These findings indicate that Internet cafes, one of the most criticized places of our daily life, are the places where children use computer for the first time. Computer ownership and use along with Internet access varies according to gender. 66,3% of male students have a computer at home whereas 48% of females have a computer at home. Male students also have advantage over girls regarding



Internet access due to the disproportionately high level of access opportunities of the boys to Internet cafes in Turkish social and economic context.

Another question asked at interviews was "How did you learn to use computer?" The answer to this question varies according to the schools in the sample. 71,8% of the students drawn from TED Isparta College expressed that they learned how to use computers on their own while 18,4% of them learned it from a friend or relative. 67,8% of the students from Ülkü Primary Schools said that they learned it on their own while 22% of them learned it at school. 26,2% of the students from Gülbirlik Primary School said that they did not know how to use computers while 23,8% of them learned it on their own and 45,2% of them learned it from a friend or a relative. Given the data above, it could be asserted that students coming from low income families tend to learn how to use computers from friends-relatives or at school.

Computer ownership at home is a pre-condition to improve computer skills. 73,6% of students who had a computer at home expressed that they learned how to use computer on his or her own. On the other hand, 37,5% of students who did not have a computer said that they learned how to use computers at school. In this context it seems clear that those students who don't have computer at home should be introduced to the functional use of computers. This would help at least reduce the digital divide.



Graphic 4. Time Spent Using Computers in a Day

As shown in Graphic 4 above, 34% of the students expressed that they used a computer for less than 1 hour a day. 26% of them said that they used it for 1 to 2 hours whereas 11% of them expressed that they used it for 2 to 3 hours. 12% of them pointed out that they used it for 3 hours or more.

## Conclusion

The use of computer and its applications have increased in all aspects of our daily life as well as organizational, social and economic life. The level of the access to and utilization of new technologies depends on various social

factors. Yet, improvements in Information Technologies and its applications are shaped by the factors excluding schools. The first step to use Information Technologies efficiently should be the removal of obstacles in access to technology. In this respect, it is important to remove the technological gap between urban and rural schools. The policies regarding computer use and its applications should be put into a stable framework and implemented nationwide, particularly in economically and geographically disadvantaged areas. In this context, it is necessary for Turkey to adopt new policies regarding the use and penetration of new information Technologies into the society at all possible points. These new policies along with the choices of educational institutions on Information Technologies will determine the level and wideness of the inequalities in society in the coming years.

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