The Contributions of E-School, a Student Information Management System, to the Data Processes, Environment, Education and Economy of Turkey

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Abstract

This paper is about E-school system which has a great importance in increasing the effectiveness of Turkey's Education. E-school is mainly computerized Education Management Information System. It is dynamic, web-based Student Information Management System for centralized Education System of Turkey that provides solutions for schools so as to manage student data. It is developed by using innovative web based software and database technologies to enhance education and used by any kind of formal public or private preschool, primary and secondary schools, inside or outside Turkey, controlled by Ministry of National Education.

Firstly, the article contains a short summary of implementation process, technique, core components, design, and user profiles of E-school. In the main part, it discusses how student information management in Turkey's Education has been handled before and after E-school system. Principally, it emphasizes on how collection, processing, storage, accuracy, analysis and dissemination of student data, organizational policy and productivity, planning, statistic, scalability and transparency in Turkey's National Education sector are improved after implementing E-school. In addition, it focuses on how E-school contributes to teachers, educational authorities, policy makers, students, parents also environment, Education System and Economy of Turkey.

Keywords: *E-school, information communication technology, student information management system, Education Management Information System, Education of Turkey*

INTRODUCTION

... ICT components typically help in (a) supplying computers and connectivity and building school computer labs; (b) enabling instruction in computer programming and computer literacy; (c) (to a lesser extent) developing and disseminating new curricula in electronic format; (d) distance learning (especially as it relates to teacher professional development); and (e) enabling better administration in the education sector (particularly through the development of education management information systems, or EMIS) (Trucano, 2005)

Information and communications technology has been transforming education at different levels. One level where the ICT has been playing a key role for over the last three decades is in the management and allocation of educational resources and providing data on students and teachers often referred to as Education Management Information System (EMIS). According to Tom Cassidy: EMIS is a "system for the collection, integration, processing, maintenance and dissemination of data and information to support decision making, policy-analysis and formulation, planning, monitoring and management at all levels of an education system." (Adam, 2011).

ICTs are being used to help meet education objectives. As many researches prove that ICT use in student information management facilitates collection, processing and spreading endeavor for student data related to education in the ways by enabling data accumulation at a center from schools in distance provinces more efficiently, quickly and inexpensively than using traditional paper-based methods and handling data processing and dissemination by computers easily and accurately. In today's world, existing ICT infrastructures at schools in many countries provides those opportunities and it is also appropriate for Turkey that all primary and secondary schools in Turkey have basic ICT infrastructure to use such ICT components in student information management.

Before 2007, to state and solve problems both locally and nationally by developing fast and accurate, current educational policy through providing transparency MoNE did not have a centralized student based database system in all states of education from all over Turkey. In applying nationally stated policies locally created various undesirable applications. It was not possible to answer the demand of statistics and institutions that have contributions in developing educational policies. There was a lack of technology use in collecting and supervision in student information regarding education. Previously the students' personal characteristics and their academic past were not filed electronically at the center of MoNE therefore it was not available to analyze them easily and accurately. High demands of funds were spent for studies especially gathering and collecting student data in education. All in all, it was hard to consider administrative and functional scalability of Turkey's National Education.

A project team consists of six professionals; ICT Teachers experienced not only in ICT use in education but also software and database development, was charged within organization and worked on meeting the needs of Turkish Education System mentioned above. All of the educational institutions' functions, administrations and circular letters about student data management were considered as a whole and the entire characteristics and needs of them were clearly defined. Carrying out the required analysis and designing the system took one year. By analyzing the present

situation and taking Turkish Education System's benefits into account, the team developed a new student information management software (E-school) to monitor and enhance education in the base of the school, sub-province, province, and national. Primary schools started to use in the second term of 2006-2007 education year and the secondary schools did in the first term of 2008-2009. The maintenance and development of E-school has been continuing with feedback from users and adopting new innovative technologies.

E-SCHOOL

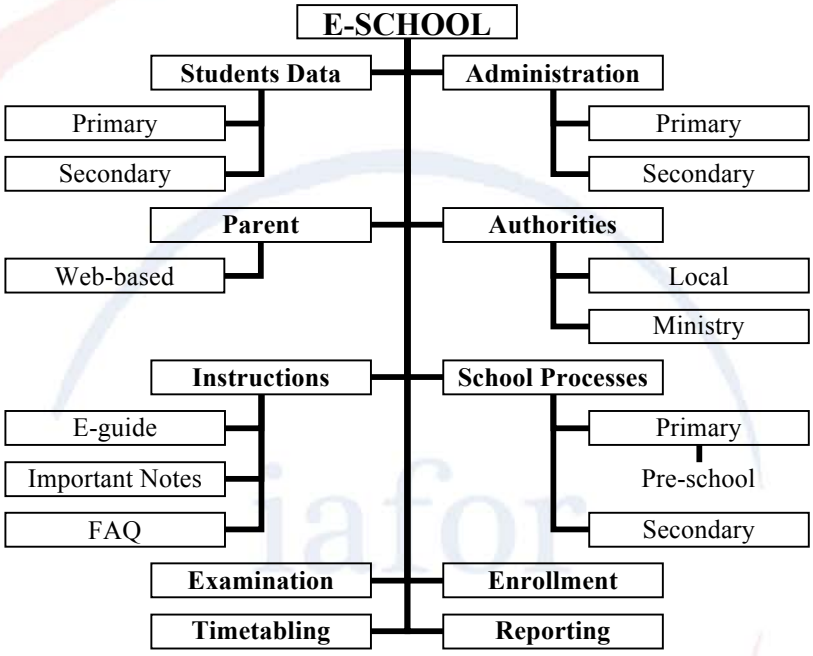

Figure 1. Core components of E-School

E-school is accessible through http://e-okul.meb.gov.tr. It is a dynamic, expanding, thriving, sustainable, computerized, web-based Student Information Management System for Turkey's Centralized Education System that provides denouements for schools in order to cope with student data. It is developed by using innovative web based software and database technologies for enhancing education by providing electronic platform in order to collect, record, analyze, report, disseminate, control, monitor and manage students' data related to education like enrollment, local or centralized exam entries, attendance, grades, transcript, report cards, behavior, assignments, and so forth. E-school consists of nearly 500 web pages and 800 report forms. It is used by any kind of formal public or private preschool, primary and secondary schools, inside or outside Turkey, under MoNE. All the processes on students' data are classified and grouped in E-school according to relevance and transaction of data process. The data that concerns about %75 of the country's total population proves how great system E-school is.

Administrative Module: All affairs, like creating, updating and deleting, regarding E-school users and user groups such as teachers and school administrators are handled through this module.

Ministry/Local Authorities Module: Reports of evaluating success, examination, and children not enrolled, need analysis for new teachers, distributing books and absentees list are handled by Ministry or Local Education Authorities.

School Processes Module: This module contains data like physical conditions of school buildings and instructional methods, students' enrollment, behavior, transfer, absenteeism, grades and diploma.

Students Information Module: It manages student records such as class, certificates, attendance, grade, transcripts, social activities, demographic, health, physical, parents and parents' income.

Enrollment Module: By cooperating with the national address based information system of Ministry of the Interior, the E-school's enrollment module finds out the addresses of students automatically, who are in compulsory education age but not enrolled to school, and enroll them in the school which is near to enrollee's home address.

Examination Module: The instruction manuals about centralized qualifying examinations like Secondary Education Qualifying, and Boarding School and Scholarship Exams related to primary and secondary education students, those application forms, and information about examinations places, examination result are handled through this module.

Reporting Module: There are about 800 different reports concerning all process of students' education such as lists of students not enrolled, student class list, result of Secondary Education Qualifying exam, disabled students, report card, gender equity issues and etc.

Figure 2. A view of E-school

Parent Notification Module: Parents can observe only their own children's information details concerning school life such as attendance, disciplinary, progress overall and schedule.

Timetabling Module: This module can create a high precision weekly timetable automatically.

SYSTEM REQUIREMENTS

The latest advances in web-based technologies used in E-school make it easier to deploy for a new school. There is no need to install a specific program or database to a computer. In addition to user name and password taken from the authorities of E-school administrators, it is enough to have a computer, an Internet Access and web page browser.

TECHNOLOGIES USED

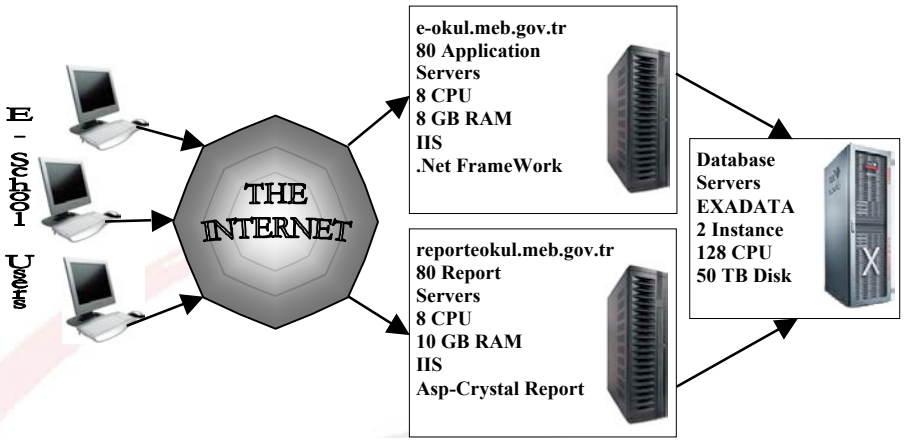

Figure 3. Architecture of E-School

It is developed by using web software technologies like Microsoft ASP .NET, C#, and Java. Reporting platform is Crystal Report. Database Management System is Oracle and PL/SQL is used. There are nearly 80 Web Applications, 80 Report Servers, and 2 Instance database servers that serve for E-school.

USER INTERFACE

It is observed that design of E-school web pages is simple and user-friendly. Color combinations of different panels, object and text on a page do not make users confused. The colors of main parts like toolbar and menu throughout all web pages of E-school is persistent. The main colors used are blue, grey and white. It is seen that a standard menu, toolbar, links, buttons are implemented throughout all web pages and reports of it. That provides users of E-school with easy use of new pages. Text and graphics are legible and highly qualitative. Pictures like students' photo have good quality to identify. In addition, there are also applications for blind users.

USERS

Figure 4. The countries in which E-School is used

E-school system is regularly used by people including nearly 50.000 preschool, primary and secondary education school administrators, 700.000 teachers, 16.000.000 students and 4.000.000 parents, administrators from 81 provinces, 1000 districts and 15 General Directorates. It is the most commonly used website among the other public-institution websites of Turkey. Figure 4 shows the countries in which E-school is used by only schools under Ministry of Turkish National Education.

CONTRIBUTIONS

1. Standardization of Student Information Management Software

Before E-school, each primary and secondary school in Turkey could have its own student information management systems and those systems were different from one another according to their structure and usage. E-school has made it possible that there is now a standard student information management system structure for all primary and secondary education schools of Turkey. The standard results in easy use of the system for school administrators, teachers and parents when they change their school.

2. Data Processes

2.1. Collecting Data: It was so difficult and taking much time to gather information in conventional ways, via paper, post or fax from each school all over Turkey needed for such as making decisions and statistics in education for MoNE. On the other hand, E-school provides opportunity to collect all data from all primary and secondary schools of Turkey in a database by way of web forms in which school staff enter the information required over the Internet. It is obvious that E-school hastens the collecting process of data in the ways making it more easy and short.

2.2. Accessing to Gathered Data: Before E-school, it has some hardships to reach gathered data at schools or at MoNE by getting the data archives physically or requesting through time consuming paper, postal and fax methods. However, E-

school database can be accessed securely by authorized users such as school administrators, education policy makers, statistician, parents and teachers. Its access is easy and fast via World Wide Web over the Internet remotely anywhere without being at data centers and in any time.

2.3. Data Search: In order to search for a specific information in conventional paper-based system, it is so obvious that extensive time, physical and mental effort are required while sorting through lots of documents to find the intended information. With E-school, there is no more a need for that kind of sorting. It is easy to find a specific data such as a student's first exam math grade for the first semester in 2009 in E-school's electronic database archives within seconds with typing a few words or clicking mouse. What is more, in order to control a student's diploma whether fake or not, E-school computerized database archive makes it easier to find that information related to the past.

2.4. Classification of Data: Before E-school, for a paper-based student's information management system at schools in Turkey, labored efforts and much more time were needed so that authorized professionals could change the classification and order of data on papers, or place of data archive. E-school database can be classified, arranged and replaced immediately with sending a few command to computers without extensive efforts and much more time. For example, data could be classified immediately according to criteria like city, district, school, student's name, success, and etc.

2.5. Data Analysis and Statistic: Before E-school, it needed so hard, inefficient and time consuming effort to gather data. After gathering data it was the same for analyzing and explaining the collected data from all primary and secondary schools of Turkey at the centre of MoNE and it is the same for statistic. The tolerance of results could be bigger than expected. E-school overcomes those issues on account of the fact that it has some innovative statistical tools which analyses pure data fast and efficiently. It makes the result reasonable for educational professionals and policy makers by showing the facts on graphs.

2.6. Maintaining Data: Data protecting, modifying, maintaining, updating, expanding, and backing up procedures are required extensive time, physical and cognitive effort for conventional paper-based system. For example, for bulk back-up, every school must find and copy every single paper record one by one. Another example is that every single paper must be found and drawn one more column on it in order to expand data if there is enough space. On the other hand, it is very easy and fast to handle those procedures with E-school. For example, for bulk back-up, it is all about only sending a few commands to computers. In addition, it is easy and fast to change place of E-school's all data archives saved in hard disk. Another example is about expanding data, it is just adding fields to related table of E-school database with sending a few computer command.

2.7. Accuracy of Data: It is a known fact that human beings and so teachers, school administrators and other professionals in education might make mistakes while they perform mathematical or some other operations on any kind of students' data without using any computerized machines. A forgotten number or an addition of one more number can critically change the accuracy of a student's certificate such as diploma. On the other hand, E-school ensures the preciseness of students' data and certificate

such as diploma and report card. All mathematical operations on students' data like additions, subtractions, division and other calculations related to education process of students are carried out by the computers. Furthermore, accuracy of gathered data is expected to be less after gathering information in conventional ways. Over the Internet, each school staff enters the data to the E-school systems via web forms that have some controlling scripts. Now, data from all schools of Turkey gathered by E-school is more complete and valid.

2.8. Legibility of Data: The paper, which is a conventional data storing medium, can become dirtied, faded or damaged, makes the datum difficult to unravel over time. Also, the data written by hand can be impossible or difficult to read with poor or illegible handwriting. E-school as a computerized system eliminates these issues, resulting in a more accurate, clean, legible and organized method of document management over the long term.

2.9. Secured Data: Before E-school, there was more security problems with students' data located at schools with paper format. Precaution for securing that data could be insufficient against flood disaster, fire, terror, and earthquake and stealing. Digital backups of data are made to protect against any loss of data at the centre of MoNE. So there is no more a need to protect data for each school administrators. These backups help E-school to survive and maintain, regardless of any threat including catastrophe to the original data. In addition to Firewall, IPS is used to control data traffic and package. Once a year, it is tested according to penetration and vulnerability. It complies with information security standards of ISO / IECC 27001.

2.10. Space and Equipments for Data Documents: It is favourable contribution that E-school created additional space in whole primary and secondary schools because there is less need to store a large volume of paper records or files of students' data and also furniture or cabinet for those records and files.

3. Automation

Information management of students in educational activities and processes such as enrollment, transfer, scores, examination, attendance, parents notification and also weekly timetable are automated with E-school. That removes many troublesome and time consuming manual bureaucratic processes. Majority processes of performing mathematical calculation on student's data, preparing report card and diploma, keeping the students information, updating and filing, and composing students' files are automated by E-school. For instance, transferring and integrating a student's education documents from old school to new one, such as student file, can be handled electronically in just a few moments over the Internet. In addition to calculations and many other operations on students' data being automated, web-based E-school system allows various reports highlighting anomalies in the education system, such as gender issues, lists of students' not enrolled and disabled students in a city of Turkey, to be generated at the click of a mouse button or typing a few words. For example, E-school helps to create documents such as diplomas and report cards, which once took a school administrator much time to compile, in a matter of seconds. An additional benefit to automating the students' education process is the ability to expediently share information. Information regarding students' education can be independently entered into and taken from the system at the same time by multiple authorized people such as teachers. Lastly, E-school can create a high precision weekly timetable

automatically. It is an advantage to resolve such long time consuming problem while processing weekly timetable manually for school administrator.

4. Enrollment Processes

Before E-school, it was much difficult to identify the school age children that were out the school. Those were the children not only work in industry, agriculture and service sector, but also had some cultural and social oppression especially for female children from rural regions. There could be erroneous transactions through that process because it depended mainly on the school administrators' and teachers' responsibility. It was decided by teachers and school administrators that whether a child needed to be enrolled or not to a school after having controlled child's age, physical and cognitive development. That made the child started to school before or after the school age which caused some negative issues for child like adaptation problem. In addition, some parents forced teachers or school administrator to enroll their children younger than schooll age.

It is automated that the system provides to identify those children. By cooperating with the national address based information system of Ministry of the Interior, the E-school system finds out the addresses of students automatically, who were in compulsory education age but not enrolled to school and enroll them. That solved issue of starting a child to school before or after the school age. In addition, some parents cannot force teachers or school administrator to enroll their children younger than schooll age. It is an advantage that there is no more a need for parents to present such documents, like copies of birth certificate, identity card, residence, telephone, and water invoice to school in order to enroll his or her child. According to a research, it is an advantage of knowing how many students would enroll to school before enrolling process for school administrators in order to make more efficient enrollment process plans. (Sincar & Özbek, 2011)

5. Absenteeism Processes

Non-Attendance Module is developed for children enrolled to school but absent depending on various excuses. By this module, the students under risk of absenteeism can be monitored and determined and so the required precautions for that absenteeism can be taken easly and in time. Furthermore, with the use of the Catch-Up Module for students fall behind the programme, the monitoring of the students is also available and thousands of children were involved to education. Furthermore, it is possible to make advanced analysis on absentees like absentees resulting from economically disadvantaged situation.

6. Examination Processes

Before E-school, centralized qualifying examinations, related to primary and secondary education students, such as Secondary Education Qualifying Exam, Boarding School and Scholarship Exam, and Regional Boarding School Exam, were handled in conventional ways. All procedures including instruction manuals about exams, exam application forms, information about examinations places, and examination result documented on papers at Centre of MoNE and sent to schools and students all over Turkey by post. With E-school, the instruction manuals about all these documented in web based platform electronically. That makes those examination procedures fast and more accurate. That system also automatizes examination payment control procedures. Exam fee is paid to some bank accounts

opened for examinations, this computerized bank account systems and E-school can work together for controlling exam fee whether it is paid or not.

7. Processes of Making Decisions in Education

Before E-school, customary gathering and analyzing methods made decision making processes difficult and longer in order to formulate national education policy, coordinate policies, set standards and to monitor performance in education for MoNE. On the contrary, E-school hastens the processes in the ways data can be accessed without great difficulty. Statistical tools analyse and integrate pure data and make it reasonable for educators and policy makers by bringing growths, trends, risk and relational implications to the known surface. Therefore, it is much more easy and accurate for educational policy makers at the center of MoNE, in order to analyze educational requirements such as building new schools or classroom, employing new teachers, procuring new educational equipment, regarding potential or existing students, and preparing the centralized exam files. With accuracy of data provided by E-school, more healthy and efficient decisions can be taken about Turkey's educational requirements and planning.

8. Parent Notification

Through the system, the opportunity of communicating with parents and notification of education process of 16 million students is provided. Monitoring the student information for parents is much easier with E-school's parent notification module. Parents can supervise the student information like attendance, disciplinary and progress overall record through the module without attending the parents meeting or waiting student's report card. By opening the module to parents, transparency is provided in each step of the procedures concerning the students' school life.

9. Preventing Creating Counterfeit Documents

E-school helps to prevent creating counterfeit school report, diploma**,** certificate of appreciation, certificate of honor, and testimonial documents by given every document a unique security number and preparing those documents based on saved data of the system.

10. Protecting Environment

By this system, all the procedures concerning about 16 million students' education are transferred to electronic media. In detail, before E-school project, each primary and secondary school student in Turkey had a student portfolio including student enrolment, school transfer documents, the correspondences with parents and the files on consultancy. Furthermore, each school administration used to keep 25 enrolment files for students. E-school's enrollment and examination modules made those enrollment and examination procedures not paper based and resulted in less paper usage for those processes. In addition, parent notification module decreases usage of paper letters for informing parents. It is marvelous result that less paper is used in schools for educational processes of students with E-school.

11. Economic

Previously, each student had a student portfolio mentioned above. Annual cost of this file is about 3 TL (approximately $2 USD) for a student. Each school administration used to keep 25 enrolment files for students. By transferring these files related to

almost 16 Million students to electronic media nearly 80 million TL (almost $50 million) is saved annually.
Establishing a student information management automation system costs almost 1000 TL ($625 USD) for each school who could afford. By E-school, which was developed by MoNE's own personnel, schools can benefit from it for free. The school expense of schools on those software disappeared and almost 40 million TL (equaling to $25 million USD) are saved yearly.
Prior to E-school, it would cost almost 9 TL ($6) to inform per parent by post and paper annually but there is no more a need for such an expense by the system. This leads to saving up 135 million ($85 million) annually.
There is no more such expenses like backup, maintenance, and security of students' data for schools. It is obvious that E-school decreased the expense of archiving materials by decreasing the paper and file usage at schools.Making examination procedures electronically decreased the expense of those examination procedures at schools by lessening the paper and post usage.Enrollment module brings about no more a need for copies of birth certificate, identity card, residence, telephone and water invoice so that expense of such photocopy disappeared. Financial allocation is more efficient by assessing resource allocations such as number of books needed by students in education in an accurate manner. Finally, thanks to automated system, gained time by professionals in education while managing student information is priceless.

12. Gaining Time

All advantages as a result of that automation mentioned above results in less remarkable time needed for student information management, which can help to concentrate on the education more for teachers and school administrators. Also parents spend less time for notification.

13. Other Functional Projects Based on E-school's Data

Data of E-school is also used by some other important and functional web-based modules developed for education such as licensing Turkish folk players and musician at schools from all over Turkey, licensing students for any kind of sports, like football, needed for sports organization between school at local and national level, boy scout and students camping, disabled students, module of analyzing needs for new teachers, open primary education and vocational high school. With E-school data, these modules were implemented easily and got better performance for automation.
With the disabled students' module, the real number of those students identified accurately and so the money provided for those students by MoNE was taken under control. Thanks to the module, approximately $5,5 Million USD, which was defrauded by some disabled school owners, is saved monthly. Students that graduated can be monitored by graduates module. With the module of analyzing needs for new teachers all around Turkey, it is possible to distribute teachers more precisely to schools. Finally, those licensing modules help to prevent creating counterfeit license. Student camp application and selection module provides solutions for unjustness in these processes and the money provided for those activities by MoNE was taken under control by knowing the actual number of license and applications.

14. A Model to Other Education System

Taking all advantages of E-school mentioned in this paper into account, sharing experience of E-school is worthy of international recognition. E-school has been introducing at international platforms and it took great interest by concerned educational professionals. A few countries such as Netherlands and Republic of Azerbaijan analyzed the system. Turkey's E-school, the student information management system in education activities, can be a model to other countries' education. Not only does E-school help manage students' information through school life, but it also contributes to country's economy, future of education and innovation in education. E-school is more likely to be implemented in countries whose education systems are centralized.

CONCLUSION

In this paper, it is elucidated what E-school is and how student information management has been handled in Turkey's education before and after E-school. It emphasizes on the contributions of E-school not only to dynamics in education like teachers but also to data processes, environment, Turkey's Education System and economy.

E-school creates change and transforms ICT use in education. The system gives a clear picture of education and provides lasting impact on a significant scale. It provides school and educational administrators, policy makers and teachers with easy management of students' information procedures and those processes function fast and economic by automation which lessens bureaucratic procedures. It is now more accurate to find out the students not registered, the absentee and also to monitor the academic success, physical and cognitive development, behavioral patterns.

The system helps the administrators, teachers and policy makers make accurate, fast analysis and decisions about such as immediate needs and development of education system by enabling them to carry out their task easily, efficiently, and timely manner. As a result, it helps them focus on the educational aspect more, the learning needs of students.

E-school results in a more accurate, clean, legible and organized data over the long term by improving information characteristic of students. This system makes data processes easier by checking the sameness of data items within multiple fields, establishing a mutual relation between them, executing mathematical operation on them, and fetching only the data that matches each single principle. The education statistic is strengthened and reliability is improved by producing more relevant, reliable and timely data.

E-school plays an important role in expediting preparation of academic research, policies development studies, strategic plans and projects by referring emerging organizational issues and providing appropriate, valuable and accurate information. It is easy to consider administrative and functional scalability of Turkey's Education System for district, province, regional and national based.

Making centralized exams and enrollment procedures automated removes many difficulties and time consuming manual bureaucratic processes. By Non-Attendance

and Catch-Up Module, the students under risk of absenteeism can be determined and so the required precautions can be taken easily in time. By saving almost 150 million papers spent for 16 million students, Turkish Education has become a more sustainable eco-friendly system.

Considering all the advantages economically, especially saved time while handling student information, the public expenditure of money on student information management decreased at noteworty. The saving is transferred in improving the quality and development of education.

With all outstanding contributions, E-school can be an example for other countries. Finally, by gathering new generations' whole education and behaviour data at a center, E-school helps make efficient plans and take precautions for the future of the nation.

REFERENCES

Adam, L., 2011. *How Can Holistic Education Management Information Systems Improve Education?, Educational Technology Debate.* [online] Available at: from <https://edutechdebate.org/education- management-information-systems/how-can-holistic-education-management-information- systems-improve-education/> [Accessed November 6, 2012]

B., Mihal & T., Blerina & D., Arbora. (2008). *SMIS: A Web-Based School Management Information System.* Paper presented at International Scientific Conference Computer Science 2008. Retrieved January 28, 2012, from http://csconf.org/Volume2/page564.pdf

Bober, M. (2001). School information systems and their effect on school operations and culture. *Journal of Research on Technology in Education*, 33(5), 1-11.

Brecko, B. N. & Carstens, R. (2006). *Online data collection in sites 2006: paper versus web survey. Do they provide comparable results?* Paper presented at the Second International Research Conference: Proceedings of the IRC-2006, Amsterdam.

Carnoy, M. (2004). *ICT in Education: Possibilities and Challenges.* Barcelona. Retrieved October 10, 2012, from http://www.uoc.edu/inaugural04/dt/eng/carnoy1004.pdf

Demir, K. (2006). School Management Information Systems In Primary Schools. *The Turkish Online Journal of Educational Technology*, 5(2), 32-45.

European Commission Education & Culture/European Schoolnet. (2006). *The ICT Impact Report: A review of studies of ICT impact on schools in Europe*. Luxembourg

Isherwood, R. S. & Barger-Anderson, R. & Merhaut, J. *School Management Information System Implementation and Its Impact on the Loosely Coupled Organizational Structure of an Elementary School: A Case Study.* Retrieved

December 18, 2012, from www.leadingtoday.org/weleadinlearning/ spsu06school_management_information_sy.htm

Ict Development Associates Ltd. (2011). *Transformation-Ready: The strategic application of information and communication technologies in Africa.* London

Joseph, C. & Media, D. *The Advantages of a Computerized Paper System.* Retrieved December 6, 2012, from http://smallbusiness.chron.com/advantages-computerized-paper-system-27329.html

Ministry of Turkish National Education. (2012). *E-school User's Manuels.* Retrieved October 10, 2012, from http://e-okul.meb.gov.tr

Ministry of Turkish National Education.(2012). *Samples Reports and Views of E-school.* Retrieved October 11, 2011, from https://e-okul.meb.gov.tr/sample_reports_of_E-school.pdf

Nolan, C. (1996). Implementing computerized school information systems: Case studies from New Zealand. *International Journal of Educational Research,* 25(4), 335-349.

OECD/ Joint Research Centre- European Commission (2010), *Assessing the Effects of ICT in Education: Indicators, Criteria and Benchmarks for International Comparisons,* JRC.

Pelgrum, WJ 2001, Obstacles to the integration of ICT in education: results from a worldwide educational assessment. *Computers & Education,* 37, 163-178

Sincar, M. & Özbek, M. (2011). School administrators' Opinions on the Enrollment of Students Through the Address-Based Population Register System. *Journal of Education and Humanities,* 2(3), 29-52

Trucano, M. (2005). *Knowledge Maps: ICTs in Education.* Washington, DC: infoDev / World Bank.

Victoria, T. L. (2003). *ICT in Education.* UNDP, New York.

Wayan, V. (2012). *USAID Request for Proposals: Innovations in Education Data*. Retrieved December 18, 2011, from https://edutechdebate.org/education-management-information-systems/usaid- request-for-proposals-innovations-in-education-data/

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