A FEASIBILITY STUDY OF USING ICT IN IRANIAN SECONDARY SCHOOLS: THE CASE OF TEHRAN PROVINCE

Kourosh FATHI VAJARGAH
Professor of Curriculum Studies
School of Education, Shahid Beheshti University
PO Box 1983963113, Tehran. Iran
Fax: 00982122431688
Tel: 00989121480486
E-mail:kouroshfathi@hotmail.com

Ayat SAADATTLAB
PhD Candidate in Higher Education Development
School of Education, Shahid Beheshti University
PO Box 1983963113, Tehran. Iran
Fax: 00982122431688
Tel: 00982129902418
E-mail: saadattalab2009@gmail.com

ABSTRACT
This research presents the results of a feasibility assessment on implementing ICT in Tehran high schools. Mixed method research (both qualitative and quantitative) was employed and due to the nature of research, data collection included two stages: library and field study. Using the cluster method with 362 subjects, data was collected using a researcher-made questionnaire with 0.86 Alpha reliability coefficients, and then analysis was performed at two levels, using descriptive and inferential statistical approaches (frequencies, T-test and priority setting by Li-Hi test).

The results demonstrate that teachers agree on the types and features of ICT. In addition, they believe that the current status of resources, facilities and conditions for implementing ICT in schools is insufficient. The teachers confirmed the facilitating factors of ICT applications in secondary schools, which are also discussed in this paper.

Keywords: ICT application; ICT literacy; secondary school teacher's competencies; ICT feasibility study

INTRODUCTION

In the new millennium, advances in information and communication technology (ICT) have enabled its rapid proliferation throughout the world, and it now affects various aspects of human life. ICT helps expand learning opportunities, access to educational resources, expedite and facilitate the education process (Abbasi & Jalali, 2004; Yaghma, 2001). Training is the first and most important activity influenced by this constantly developing technology (Kasal, 2007). Altering the style of learning by using ICT is more than using computers in the classroom. Real change occurs when ICT broadens the thinking horizon of trainers and trainees, provides new skills and connects them to a world of new ideas and learning resources (Fathi Vajargah & Sobhani Nejad, 2007; Ontario, 2001). Garrison and Anderson (2003) acknowledged that the use of information and communication technology is inevitable for everyone to achieve the objectives of qualitative learning.

Preparing teachers with appropriate ICT application training and development is an important factor in the successful introduction of ICT into schools. However, this preparation should not be limited to conventional computer literacy (Attaran, 2006) nor teachers, students need to be prepared to successfully live and work with technological tools and they require information management strategies and technical skills (Cola, 2001).

Nowadays, society expects education systems to offer a universal education that encourages creativity and innovation, not restrict the teaching and learning context to textbooks, the class teacher or school environment. The developments in ICT have paved the way to achieve this (Frazinpour, 2004).

Currently, the main issue is not whether ICT should be used in schools, but how better to utilise ICT in secondary schools. In other words, what is the extent of possibilities in using ICT in secondary schools? Therefore, this research attempts to investigate the conditions, facilities and resources (human, financial, and

environmental) of different domains of ICT in secondary schools. Finally, the facilitating factors and barriers to exploiting this technology are explored.

ICT Education: Iranian Context

During the past two decades, computers have been used for administrative purposes in some Iranian schools; especially schools in cities such as Tehran and non-profit schools. After 1990, the Ministry of Education initiated the development of educational information technology, gradually designing and implementing comprehensive informatics systems. The ministry's objective was to establish Management Information Systems (MIS), automated operational procedures and modern information tools for planning, implementing and monitoring the expansion of qualitative and quantitative educational activities, all of which were the drivers to introduce ICT into the education system in Iran (Ebadi, 2005). Therefore, the Ministry of Education, together with the private sector, implemented several ICT projects to apply these new technologies in schools and other areas of the educational system.

One of the significant indicators of ICT application development at schools is computer-student ratio. According to reports published in 2006, this ratio has been increased from 1:300 to 1:48 at secondary schools, whereas, this ratio is under 10 in European countries (Council of Strategic ICT, 2007). The Iranian government's ICT strategic plans now include ICT application development in education and actions to improve the competency of Iranian authorities to transition from traditional education to e-learning and the provision of computer skills to students. Accordingly, the Iranian IT community involved with institutions of education is positively affected by ICT developments and the overall improvements in the Ministry of Education of Iran (Ayti, 2006). Communication technologies, such as the cassette recorder, video and TV, and more recent word processors and internet are considered important tools in collecting, recording and presenting data in different ways (Herne, Jessel, Griffiths, 2001; Mohammadi, 2002; Raees Dana, 2002).

ICT in education is more than just hardware: It is a culture, a program, an active educational process that defines the content of modern education. To be effective however, it needs to be a profitable culture, one that exploits the utility of ICT tools in educational environment (Ebadi, 2004).

Effective use of ICT is accompanied by special advantages for the student, contributing to the student learning process and increasing their motivation. In addition, it fosters student competition and enhances their self-confidence and self-esteem (Williams, Nicholas & Jamali, 2006). Guttman (2001) stated that high school curriculum has adapted to accommodate ICT educational aims and Lockard and Abrams (2001) acknowledged that while some educators still resist ICT educational tools, the majority commit to it. Once educators believe in the positive effect of ICT to students' pedagogical achievements, they readily adopt its use in teaching and research (Van Melle, 2005).

Previous research has suggested that lack of skill and preparation of teachers are the most important barriers to the adoption of ICT in education, whereas success has resulted from serious and purposeful efforts to train teachers (Attaran, 2004; Hakkarainen et al., 2000; Orhun, 2004; Williams, Wilson, Richardson, Tuson, & Coles, 1998).

Davis, Bagoozy and Varsaw (1989) in their research showed that the technology acceptance model and reasoned action theory indicated the mental implication of students: The effectiveness and usefulness of technology affected students' decision to use technology, while students' mental interpretation of the effort of using the technology had lesser affect on their decision to use it.

The study by Hu, Clark and Ma. (2003) indicated that there was a meaningful relationship between the use of computers and the Internet in training teachers and the learning progress of students. Teachers were more successful when using computers and accessing the network, which correlated to a significant progress in students' learning and positive reinforcement of the teachers' decision to utilise ICT.

Ghasemi-Nejjad (2005) reported that to accommodate ICT in the teaching environment, some changes were required; Curriculum structure, reforms to existing lessons, new content for lessons, changes to performance measurement tools and staff training. It may also be necessary to change the way staff participate in the decision-making process and provide feedback on the current contribution to teaching and learning made by technology and its future challenges.

RESEARCH QUESTIONS

Main Question:

To what extent is it the possible to use ICT developments in secondary schools in Tehran?

Specific Questions:

(1) What areas of ICT are applicable to secondary schools?
(2) What conditions, ICT equipment and resources (human, financial, material, and environmental) are currently available at secondary schools?
(3) What conditions, ICT equipment and resources (human, financial, material, and environmental) are required at secondary schools?
(4) What are the main barriers to using ICT for teaching and learning at secondary schools?
(5) What are the main factors that facilitate the use of ICT for teaching and learning at secondary schools?

RESEARCH METHODOLOGY

To meet the study aims, which were to examine the feasibility of using ICT in secondary schools in Tehran, the researchers selected the descriptive-survey research methodology, where they assessed the status quo and present situation with respect to the feasibility of using ICT and surveyed teachers opinions on the feasibility of using ICT in secondary schools.

The research population included 6,431 high school teachers (male) in Tehran. Cluster sampling was used to select the research sample from the 19 educational districts of Tehran, divided into five geographical categories of north, south, east, west, and centre, with one educational district randomly selected later. (The breakdown of the selected districts is shown in Table 1.)

Table 1. Selected educational districts from cluster sample.

Row	Category	Educational Districts
1	North	1
2	South	15
3	Centre	6
4	East	14
5	West	9

Data collection employed a researcher-made questionnaire, with 67 questions designed for the Likert scale, which exhibited 0.86 Alpha reliability coefficients. To develop the questionnaire, the items were designed according to the research objectives and theoretical framework on five issues: The applicability of ICT features, the present situation of ICT use, desired conditions for ICT use, obstacles to ICT use, and facilitating factors in using ICT. The questionnaire was tested for validity by seven ICT experts, following which some items were modified.

Data analysis was done at two levels of descriptive and inferential statistic interpretations (frequencies, T-test and priority setting by Li-Hi test) and the significance level set for this research was $\alpha = 0.05$.

FINDINGS

The teachers' responses in relation to the feasibility of applying ICT in Tehran secondary schools (shown in Table 2) all have a mean above two and achieved a value for *t* with significance level of $\alpha = 0.05$, which suggests that from the teachers point of view, all the ICT items are applicable in secondary schools and are crucially important.

Table 2. Results of t-test for the most applicable area of ICT in secondary schools.

	Indicator / **Item**	Frequency	Mean	Standard Deviation	Test Value = 2		
					t	df	Sig. Level
1	Accessibility of digital library and global Internet information in secondary schools.	362	2.5880	.57697	19.130	361	./…
2	Feasibility of using website and email to announce the exam programs.	362	2.6160	.53578	21.876	361	./…
3	Providing the facilities for	362	2.4724	.60061	14.964	361	./…

	teachers to be aware of their promotion situation via a website or email.						
4	Providing the facilities for teachers to use website or email for official correspondence.	362	2.6796	.52849	24.465	361	./…
5	Producing digital educational resources (book, pamphlet, slide, problem solve, newspaper etc.) for students.	362	2.4282	.61521	13.242	361	./…
6	Providing the facilities for teachers to use website or email for the result of transfusion.	362	2.5249	.57239	17.446	361	./…
7	Providing the facilities for teachers to use website or email for assigning homework and receiving the solution from students.	362	2.3260	.58023	10.689	361	./…
8	Providing the facilities for student's parents to use website or email for checking the curriculum situation and exams results of their children.	362	2.6630	.54920	22.968	361	./…
9	Providing the facilities for student and their parent to communicate with school administrator and teachers.	362	2.6878	.49855	26.251	361	./…
10	Providing the facilities for school administrator and teachers to use website or email to communicate with administrator and teachers of other schools for discourse.	362	2.7541	.47403	30.269	361	./…
11	Providing the facilities for holding the online exams through Internet or local network of the school.	362	2.6436	.53423	22.923	361	./…
12	Assigning or encouraging students to use software related to specific courses or used for doing calculations better, solving the problem, drawing the shapes, typing and …	362	2.4365	.62947	13.193	361	./…

The overall results (see Table 3) to questions on the available conditions, ICT equipment and resources (human, financial, material, and environmental) in secondary schools, show all the items have a mean below two, have achieved a value for *t* with significance level of $\alpha = 0.05$, and that from a teachers point of view, the current situation—conditions, ITC equipment and resources—is not suitable for using ICT in the surveyed secondary schools.

To use ICT effectively in the classroom, a certain level of ICT infrastructure, equipment and resources (human, financial, material, and environmental) is required in schools. What can be inferred from the teachers' responses is that they believe that the present conditions, equipment and resources in secondary schools are inadequate for the application of ICT.

Table 3. Results of t-test for current conditions, equipment and resources for using ICT in secondary schools.

	Indicator **Item**	Frequency	Mean	Standard Deviation	Test Value = 2		
					t	df	Sig. Level
1	Access to digital libraries & information on the web.	362	1.1685	.49575	-31.912	361	./…
2	Careful planning of computer workshops in schools.	362	1.2431	.54850	-26.255	361	./…
3	Providing appropriate scientific & educational magazines at computer workshops in schools.	362	1.2155	.49706	-30.030	361	./…
4	To make the computer workshops equipped to various types of computer hardware suitable for teachers and students.	362	1.2680	.55950	-24.894	361	./…
5	Availability of classroom equipped with PC projectors for teachers' presentations.	362	1.3149	.55225	-23.603	361	./…
6	Preparing teachers to use computer in workshops at schools.	362	1.2348	.52905	-27.519	361	./…
7	Providing digital copier material equipment in schools.	362	1.3591	.57490	-21.210	361	./…
8	Facilities for teachers to use the Internet in schools.	362	1.3039	.58744	-22.547	361	./…
9	Availability of inexpensive Internet for teachers and students.	362	1.2486	.53577	-26.683	361	./…
10	Schools have access to necessary budgets for the development of ICT.	362	1.1989	.50941	-29.921	361	./…
11	Expansion of accessible communication networks.	362	1.3895	.60028	-19.350	361	./…
12	Providing personal web sites for teachers.	362	1.1740	.48819	-32.191	361	./…

The overall results from the questions about the required conditions, ICT equipment and resources to use ICT effectively in schools (shown in Table 4), show all the items have a mean above two and achieved a value for *t* with significance level of $\alpha = 0.05$. From the teachers point of view, the results indicate that significant improvements to the conditions, ICT equipment and resources are required to apply ICT effectively in teaching and learning.

Table 4: Results of t-test for the required conditions, IT equipment and resources to use ICT at secondary schools.

	Indicator **Item**	Frequency	Mean	Standard Deviation	Test Value = 2		
					t	df	Sig. Level
1	Access to digital libraries & information on the web.	362	1.1685	.49575	-31.912	361	./…
2	Careful planning of computer workshops in schools.	362	1.2431	.54850	-26.255	361	./…
3	Providing appropriate scientific & educational magazines at computer workshops in schools.	362	1.2155	.49706	-30.030	361	./…
4	To make the computer workshops equipped to various types of computer hardware suitable for teachers and students.	362	1.2680	.55950	-24.894	361	./…

5	Availability of classroom equipped with PC projectors for teachers' presentations.	362	1.3149	.55225	-23.603	361	./…
6	Preparing teachers to use computer in workshops at schools.	362	1.2348	.52905	-27.519	361	./…
7	Providing digital copier material equipment in schools.	362	1.3591	.57490	-21.210	361	./…
8	Facilities for teachers to use the Internet in schools.	362	1.3039	.58744	-22.547	361	./…
9	Availability of inexpensive Internet for teachers and students.	362	1.2486	.53577	-26.683	361	./…
10	Schools have access to necessary budgets for the development of ICT.	362	1.1989	.50941	-29.921	361	./…
11	Expansion of accessible communication networks.	362	1.3895	.60028	-19.350	361	./…
12	Providing personal web sites for teachers.	362	1.1740	.48819	-32.191	361	./…

The overall results for barriers to using ICT in secondary schools (shown in Table 5), revealed all the items have a mean above two, achieved a value for *t* with significance level of α= 0.05, and from the teachers point of view, the items are significant barriers to using ICT successfully in secondary schools and need to be addressed.

Table (5): Results of t-test for main barriers to ICT use in secondary schools.

	Indicator **Item**	Frequency	Mean	Standard Deviation	Test Value = 2		
					t	df	Sig. Level
1	The lack of computer hardware knowledge of teachers and students.	362	2.4006	.60221	12.655	361	./…
2	Not holding introductory computer classes for teachers and students.	362	2.5442	.55148	18.775	361	./…
3	The lack of motivation to use computers in educational issues among teachers.	362	2.5663	58350	18.466	361	./…
4	Teachers' lack familiarity with software helpful in teaching.	362	2.6022	.53342	21.480	361	./…
5	Teachers and students lack familiarity with the Internet and its use.	362	2.5580	.56510	18.788	361	./…
6	Teachers lack of belief about the impact of ICT to improve education.	362	2.4392	.65560	12.747	361	./…
7	The lack of morale and cooperative motivation in schools staff to embrace the new environment.	362	2.5718	.55359	19.653	361	./…
8	The lack of facilities such as digital copiers, CD copiers etc. in schools.	362	2.4144	.58571	13.460	361	./…
9	The lack of financial resources to buy computers, PC projectors and	362	2.6713	.54157	23.583	361	./…

	other necessities.						
10	The lack of classrooms and sites equipped with computers, PC projector and other necessities.	362	2.6492	.52748	23.416	361	./…

The overall responses from teachers on the factors that may facilitate the use of ICT in secondary schools (shown in Table 6) all have a mean above two and achieved a value for *t* with significance level of α= 0.05. The results show from the teachers' point of view that the items mentioned as factors to facilitate the use of ICT in secondary schools are crucial and expected to be effective.

Table 6: Results of t-test for factors that facilitate the application of ICT at secondary schools.

	Indicator **Item**	Frequency	Mean	Standard Deviation	Test Value = 2		
					t	df	Sig. Level
1	Holding training courses on windows operating system.	362	2.6050	.54826	20.995	361	./…
2	Holding training courses on an introduction to internet.	362	2.6657	.50084	25.291	361	./…
3	Holding training courses on software such as Word, PowerPoint, Excel, Access etc.	362	2.6022	.54371	21.073	361	./…
4	Holding training courses on email.	362	2.5414	.54156	19.022	361	./…
5	Holding training courses on online database and websites.	362	2.6878	.48731	26.856	361	./…
6	Providing correspondence instruction in different areas of ICT for teachers and students.	362	2.5801	.56239	19.626	361	./…
7	Providing financial support and enough ICT budget for teachers.	362	2.6575	.53551	23.359	361	./…
8	Propensity of students to attend the computer lab and use its equipment.	362	2.6630	.49059	25.712	361	./…
9	Teachers' familiarity with software which can helpful in teaching	362	2.7928	.42583	35.423	361	./…
10	Adequate budget to equip classrooms with necessary ICT hardware.	362	2.7956	.45542	33.238	361	./…
11	Positive morale and cooperative motivation of school staff to embrace the new environment.	362	2.7707	.43391	33.795	361	./…
12	Careful planning of computer workshops in schools.	362	2.7514	.46371	30.830	361	./…
13	Teachers and students have a reasonable level of computer knowledge.	362	2.7459	.44851	31.640	361	./…
14	Computer workshops are equipped with computer hardware required for teachers and students.	362	2.7210	.47316	28.992	361	./…

Table 7: Ranking the research items (areas for ICT, current situation of ICT, required conditions for ICT, barriers to ICT, and factors facilitating ICT).

Questionnaire Text **Research Questions**	1	2	3	4	5	6	7	8	9	10	11	12	13	14
The ICT areas most applicable to secondary schools	2	1	1	2	2	1	4	2	2	1	4	3		
Current conditions, ICT equipment and resources in secondary schools	4	3	4	3	1	3	1	2	3	4	1	4		
Required conditions, ICT equipment and resources to use ICT in secondary schools	2	2	1	1	4	3	4	1	1	1	3			
The barriers to using ICT in secondary schools	4	2	2	2	2	2	2	4	1	1				
Factors that facilitate the application of ICT in secondary schools	3	3	4	4	2	4	3	3	1	1	1	1	1	2

The factors were ranked using the Li Hi method (results are shown in Table 7), based on the teachers' responses to the survey questions. The highest and lowest ranked items are listed below.

High Ranking Items—ICT Areas Most Applicable to Secondary Schools

- Providing a website and emails to announce the exam programmes
- Providing a website or email facilities to announce teachers' promotions
- Providing website or email facilities for teachers to use for the result of transfusion
- Providing website or email facilities for school administrator and teachers to communicate with administrator and teachers of other schools

Low Ranking Items—ICT Areas Most Applicable to Secondary Schools

- Providing facilities for holding exams online, through the Internet or local network of the school
- Providing website or email facilities for teachers to assign homework and receive solution from students

High ranking items—Current Conditions, ICT Equipment and Resources in Secondary Schools

- Expansion of accessible communication networks
- Providing digital copier materials and equipment in schools
- Availability of classrooms equipped with PC projector for teachers' presentation

Low ranking items—Current Conditions, ICT Equipment and Resources in Secondary Schools

- Providing appropriate scientific and educational magazines at computer workshops in schools
- Providing personal web sites for teachers
- Access to necessary budgets for the development of ICT
- Access to digital libraries and information on the Internet

High Ranking Items—Required Conditions, ICT Equipment and Resources to Use ICT in Secondary Schools

- Availability of inexpensive Internet for teachers and students
- Equip computer workshops with required computer hardware for teachers and students
- Access to Internet facilities for teachers in schools
- Access to necessary budgets for the development of ICT
- Expansion of accessible communication networks
- Provide appropriate scientific and educational magazines at school computer workshops

Low Ranking Items—Required Conditions, ICT Equipment and Resources to Use ICT in Secondary Schools

- Providing digital copier and equipment in schools
- Availability of classrooms equipped with PC projectors for teachers' presentation

High Ranking Items—Barriers to Using ICT in Secondary Schools

- Lack of classrooms and sites equipped with computers, PC projectors and other necessary facilities
- The lack of financial resources to buy computers, PC projectors and other necessities

Low Ranking Items—Barriers to Using ICT in Secondary Schools

- Lack of facilities such as digital copier, CD copier and other equipment in schools
- The lack of computer hardware knowledge of teachers and students

High Ranking Items—Factors That Facilitate the Application of ICT in Secondary Schools

- Teachers and students have a reasonable level of computer knowledge
- Adequate budget to equip classrooms with necessary computer hardware
- Positive morale and cooperative motivation of school staff to embrace the new environment
- Careful planning of computer workshops in schools
- Teachers' familiarity with software which can helpful in teaching

Low Ranking Items —Factors That Facilitate the Application of ICT in Secondary Schools

- Holding training courses on software such as Word, PowerPoint, Excel, Access etc
- Holding training courses on email
- Providing correspondence instruction in different areas of ICT for teachers and students

CONCLUSION

It is imperative to employ ICT in education to improve learning outcomes and incorporate communication technologies pervasive in all aspects of students' lives. Review of existing research illustrated the extensive impact of ICT in education around the world. Based on the driving need to incorporate ICT in education, our main concern was to assess the feasibility of applying ICT in Iranian secondary schools. Specifically, we examined five main issues: 1) The most applicable areas for ICT; 2) the current conditions, ICT equipment and resources; 3) the required conditions, ICT equipment and resources; 4) the barriers to using ICT; and 5) the factors that facilitate the use ICT in secondary schools.

The results, from 362 teachers at Tehran secondary schools, identified the important areas ICT can be applied in secondary schools. The results stressed that the current conditions, equipment and resources for the application of ICT in secondary schools were not sufficient or appropriate for the successful application of ICT in secondary schools and the teachers also listed and ranked conditions, equipment and resources that they considered essential to the future of ICT in secondary schools. The barriers to ICT proposed in this study were corroborated by the teachers, suggesting that these issues, if unresolved, may hinder future deployment of ICT in secondary schools along with teacher and student development, and these issues should be addressed through appropriate measures by educational officials. In addition, policy makers should to pay serious attention to the facilitative factors teachers confirmed and ranked in this study, as these play an important role in the successful application of ICT.

When the advantages of using ICT in education are clearly understood, policy makers pay more attention to developing and applying technology in schools: Observed measures and activities in Iran and across the world around the world confirm this fact. The effective use of ICT in schools also requires that teachers believe in the benefits of technology for themselves and their students. There is a growing awareness among teachers that ICT can deliver many new opportunities, such as the capability to play a new role in the teaching/learning process: The role of knowledge facilitator instead of just a knowledge transmitter. Moreover, it should be noted that the improvement of teacher's skills and knowledge, in addition to their viewpoint, is of utmost important.

When dealing with an ICT programme of this size and scale, it is essential to address two key areas of technology risk: 1) prepare the appropriate technology infrastructure to decrease the current gap between the current and desired situation as much as possible; and 2) eliminate barriers to using ICT in schools. By achieving this, we can claim that applying ICT will create an environment that fosters creativity.

Based on the findings of the present study the following suggestions are made to pave the way for applying ICT secondary schools:

- Expand accessible communication networks
- Effective and useful planning and policy-making for the extensive use of ICT at secondary schools
- Increase school budgets to make use of ICT
- Improve the quality and quantity of classes utilising ICT in teaching and learning
- Improve the computer and internet knowledge and skills of teachers and students
- Motivate teachers and educate staff to support ICT-enabled environments
- Provide financial support for teachers to buy a computer and accessories
- Equip schools with a variety of necessary computer hardware
- Encourage teachers and students to use ICT facilities
- Create personal websites for teachers to build interest and teachers' cooperation
- Provide more facilities, such as digital libraries, and equipment for teachers' use
- Encourage teachers and students to use electronic communication with colleagues from other national or international schools both nationally and internationally.

- Acculturate the new mode of teaching and learning with effective ICT in secondary schools

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