



Investigation of Usage of Computer, Its Degree of Effectiveness, and Obstacles To Its Use In The Teaching-Learning Process

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ABSTRACT

This research intended to determine the quality of grounds for using computer, degree of effectiveness, and obstacles to using it in the learning process, according to teachers' viewpoint. The statistical population consisted of all teachers of public schools in the third district of Tehran, Iran. Participants were 90 teachers, selected by cluster multistage random sampling. Data was collected by a self-created questionnaire and analyzed by one sample t-test, independent t-test, Anova, Tukey and Pearson correlation. The results indicated that there are no proper grounds for utilizing computers in Tehran schools. However, they believe that the effectiveness of using computer in teaching the subjects is high. And also tests showed that more experienced teachers face more obvious obstacles to using computers for teaching than the less experienced. Finally, Pearson test revealed that teachers believe there is a strong correlation between the proper use of computers in schools and its associated learning outcome.

Keywords: Information & Communication Technology, Effectiveness, Obstacles

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INTRODUCTION

We have passed an era called industrial era and have stepped into a new period whose name supposed to be "meta-industrial" era. However, it turned out that the characteristics of this period is not essentially of industrial type. It has a completely novel and different system, thus has been called the era of information (Saberifar, 2014). The reason why this period is called "the era of information and communication" is the huge extent of information and their exchange through various information activities. The very substantial volume of information and the way it is exchanged have approached the today's society to entering a kind of culture in which training of information and knowledge is the main pillar of the society's development (Fill, 2010). In today's era, information is playing a major role among instruments of power as a valuable and strategic commodity and the very important

factor of development, gradually presenting itself as the greatest factor of power in countries and organizations. Effective use of information technology can bring flexibility so that it fulfills the personal needs and capabilities of each student, diminishes the risk of failure in school, provides immediate axis of the student to a wide variety of richer educational materials, demonstrates the information in novel and irrelevant ways such that the students are able to understand and absorb and finally use them. It can also enhance the learning of students with special needs, stimulate students to experiment with new beliefs and accept risks (Sanders & Morrison-Shetlar, 2001). Living in this modern world requires complete understanding and acquiring the skills needed for using these tools, without which competition and living would be very difficult, necessitating losing numerous opportunities in the daily routine of people and societies. Information and communication technologies

have a great role in improving the quality of learning. Through these technologies, students and researchers can acquire, process, and apply substantial information within a short period of time. Research has shown that use of computer and its accessories both enhances motivation of students for learning, and brings about improved spirit, self-confidence, and abilities to cope with problems (McFarlane & Sakellariou, 2002). In a project called computer-aided teaching currently being implemented in Europe, it is stated that teachers, despite being surrounded by new and advanced software applications, still require help. This project, in particular, underscores the priority of improving instruction of sciences in the classes of European schools, especially considering promoting creativity and interest of boys and girls, consisting of three stages: 1) judgment about the quality of the learning environment in training of sciences 2) aligning the best examples of teaching with teaching environments 3) evaluating the learning of students with the aim of optimizing it (Welzel-Breuer et al., 2010). Shahbaz and Zamani (2009) stated that the proper context for using computer involves both software and hardware facilities as well as the information and interest of teachers, not at a favorable level in our schools. Thus, there are various educational obstacles to operationalizing this aim. These obstacles include the challenges ahead of planners, managers, and teachers regarding utilization of information technology. On the other hand, we know that in the near future all routine activities can be done by computer and Internet, and thus the only people who can use them are those who have acquired necessary training. Computer and Internet have provided public access to information, as the most major human knowledge. Enjoying various competencies, computer and Internet provide users with numerous facilities for education, enabling them to use these educational facilities with a very high quality with a cost far lower than other learning assist tools (Zofan, 2004). Nowadays, more schools are connecting to Internet, whereby a wide range of pedagogical and educational materials become available to schools as compact discs. Therefore, researchers have been trying to investigate a wide range of issues including the way students apply information technologies, its usages, and transformations that these technologies can develop in curricula (Welzel-Breuer et al., 2010). Albirini (2006) believes that usage of computers in the home contributes to transferring positive attitudes towards using information technologies at schools. Similarly, Association (2000) regard acquiring information technology skills as essential for all students across educational systems. Furthermore, computers can be used as assist tools in classes to liberate the time of teachers and students (Stahl, Koschmann, & Suthers, 2006). Maclachlan, Jerrett, Abernathy, Sears, and Bunch (2007) indicated that use of Internet in education results in decreased costs, upgrading of information, and development of novel educational methods and techniques. The study by Hoic-Bozic, Mornar, and Boticki (2009) revealed that computer-centered learning is a proper tool for mastery learning, where through course wares, one can better learn the essential concepts, rules, and principles. Furthermore, the findings of Montague (1997) indicated that cognitive computer intervention has a

significant effect on improving the performance of active memory in students with mathematical problems. Marginson (2006) also argue that the information retention time in the memory of students is significantly greater when this information is received through demonstration and computer in comparison with when it is presented in class in a traditional way. The studies by Serin, Serin & Saygili as well as Judith E. Larkin & Harvey A. Pines indicated that application of technology affects problem-solving skills in students, where the students who did the homework related to online search acquired higher scores in comparison with the students in the control group (Liaw, Huang, & Chen, 2007b) also showed that the behavioral tendency for using electronic learning is influenced by self-efficacy, with professors and students having a positive impression about applying electronic learning systems. Zhu, Kaplan, Dershimier, and Bergom (2011) revealed that the students who bring laptops to school at least once a week and use them during the education hours enjoy a significantly higher chance of creative learning than other students. Despite the various findings suggesting benefits of using computer in learning, some studies have shown that there are some obstacles in this way. For example, despite the fact that teachers know the benefits of using computer in teaching English, the degree they use this instrument is significantly less than what is claimed in private schools (Wozney, Venkatesh, & Abrami, 2006). Ghaffari et al. (2013) analyzed the obstacles to the development of electronic education in Iran's educational system. His results imply that the obstacles to electronic education in Iran's educational system are: 1) technological 2) cultural/social 3) pedagogical 4) legal/administrative 5) strategic and 6) economic obstacles. Moreover, there is some evidence suggesting that the reason why teachers do not use information technologies is that they have not been prepared for teaching through information technology, i.e. they have not acquired the necessary preparation for applying computer and its related software and hardware (Yaghoubi, Malek Mohammadi, Iravani, Attaran, & Gheidi, 2008). Mungania (2003) introduced five factors of shortage of equipment, deficit in institutional support, lack of belief in the advantages of information and communication technologies, lack of trust, and time restriction as the obstacles to approving technology in teaching and learning. In a similar vein, Ganapati and Reddick (2013) has identified seven obstacles related to skills, psychology, access, mismatch between the method and the content, incentive-credit obstacles, organizational-legal, and cultural-social obstacles as impeding electronic learning in practical scientific instructions. Wenglinsky (1998) stated lack of relevance between working background and the technology, not participating in relevant courses in the past, lack of social support in place, shortage of resources, and digital gap as the obstacles to the development of electronic learning. On the other hand, various studies indicate that information technologies are welcomed by many students. However, the educational centers of the country have still not been recognized as an IT-based educational environments, while students have access to information technologies at home and other places such as coffee nets and their friends' homes

(Fathi Vajargah & Saadatlab, 2014). According to all these points, today understanding novel communication and educational tools and especially computer is absolutely essential for teachers and students to establish educational communications and educational dynamics. This is because not recognizing the tools and their application and scope of activity causes them to fail to upgrade their knowledge, resulting in educational passivity. Therefore, the aim of this research is investigating the role of computer as an educational medium in teaching of lessons in secondary school. In addition, the gender, teaching background, the level of education, and the major of teachers in the above sample have been examined, so that by relying on a systemic view we gain reliable results. By collating the opinion of teachers, the ground and quality of the context of using computer as well as the obstacles to it are investigated, followed by evaluation of the extent of the effectiveness of computer-aided teaching. Investigation of the background of Iranian studies indicates that there are limited practical findings regarding quality of the context of computer use as well as the degree of effectiveness and obstacles to using it in the process of learning. In previous studies, the effectiveness of computer-aided teaching had been emphasized or the obstacles to using it had been examined, overlooking the ground and context of using computer among teachers. In this research, with a systemic view, first the context of using computer, then its degree of effectiveness, and finally the obstacles and solutions to solve them have been investigated. Accordingly, this research seeks to answer these questions: is there a proper ground for using computer as a medium of instruction in Iranian high schools? To what extent application of computer results in the effectiveness of instruction? What are the obstacles to using computer? Therefore, the researcher in this study tries to respond to these questions: According to teachers, are the contexts for using computer in schools provided enough? Again according to teachers, does application of computer result in the effectiveness of instruction? What are the obstacles to using computer in the process of teaching, according to teachers? The hypotheses of this research are: there is a significant difference between the viewpoint of female and male teachers towards three variables of proper context, effectiveness, and obstacles. There is a significant difference

between the viewpoint of teachers with different teaching backgrounds towards the three variables of proper context, effectiveness of instruction, and obstacles. There is a significant difference between the perspective of teachers with different academic backgrounds towards the three variables of proper context, effectiveness of instruction, and obstacles. There is a significant difference between the standpoint of teachers with different majors towards the three variables of proper context, effectiveness of instruction, and obstacles. Finally, there is a significant relationship between presence of proper contexts for using computer and effectiveness of instruction, according to teachers.

METHOD

This nonexperimental descriptive study was conducted in the society of teachers of secondary schools in Region 3 of Tehran's Education in the school year of 2013-2014. According to Morgan table, the number of required teachers was estimated to be 90, selected through stratified cluster random sampling. For data collection, a researcher-developed questionnaire with a 5-option Likert scale was used. A questionnaire containing 44 questions was designed to investigate the opinion of teachers to evaluate three variables of proper ground for the usage of computer, the degree of effectiveness of education using computer, and obstacles to applying computer in education. The validity of the questionnaire was over 0.85. The sample teachers, as many as 100, received the questionnaires, where finally 90 questionnaires were returned. Considering the normality of the data, the data were analyzed using parametric tests of one sample t-test, independent t-test, one way analysis of variance, Tuky, and Pearson correlation by SPSS 15.

FINDINGS

In order to respond to this question whether the contexts for using computer are provided in schools, according to teachers, one sample t-test was employed. Based on Table 1 and emphasizing the value of t (-0.528, $p > 0.05$) obtained, statistically insignificant, it can be concluded that according to teachers, there is no proper ground for using computers optimally at schools in Tehran.

Table 1. One sample t-test regarding the contexts for using computer in the education at schools

Variable	Mean	St. Deviation	Std. Error	df	T	Sig
Appropriate Field	2.96	0.645	0.068	87	-0.528	-

To answer to this question whether, according to teachers, use of computer results in the effectiveness of education, one sample t-test was utilized. According to Table 2 and considering the obtained t value (-3.173, $p=0.01$), statistically

significant. the results indicated that according to teachers of the research sample, the degree of effectiveness of education using computer is high.

Table 2. One sample t-test regarding the degree of effectiveness of computer-aided education

Variable	Mean	St. Deviation	Std. Error	df	T	Sig
Effectiveness	3.31	0.550	0.058	87	-3.173	0.01

So as to answer to this question what the obstacles to using computer are in the process of teaching, one sample t-test was important. According to Table 3 and considering the obtained

t value (4.566, $p=0.01$), statistically significant.1 level, it can be concluded that the teachers have reported the obstacles to using computer at a high level.

Table 3. One sample t-test considering the obstacles to using computer in education

Variable	Mean	St. Deviation	Std. Error	Df	T	Sig
Obstacles	3.31	0.638	0.68	87	4.566	0.01

In order to analyze the first hypothesis, there is a significant difference between the viewpoint of male and female teachers towards the three variables of proper ground, effectiveness, and obstacles. In order to respond to this hypothesis, independent t-test was used. According to Table 4 and considering the obtained t value, statistically

insignificant at 0.1 level, it can be concluded that there is no significant relationship between male and female teachers regarding use of computer, the degree of effectiveness of computer as a medium of teaching, and the obstacles to using computer as a medium of instruction.

Table 4. Independent paired samples t-test regarding the comparison of viewpoint of male and female teachers towards the three variables of proper ground, effectiveness, and obstacles

Variable	Sex	Mean	St. Deviation	df	T	Sig
Appropriate field	Female	2.89	0.65	86	-0.96	-
	Male	3.03	0.63			
Effectiveness	Female	3.28	0.53	86	-0.51	-
	male	3.34	0.56			
obstacles	Female	3.21	0.69	86	-1.45	-
	male	3.40	0.57			

To analyze this second hypothesis, there is a significant difference between the standpoint of teachers with different teaching backgrounds for the three variables of proper grounds, effectiveness of education, and obstacles. One-way analysis of variance and Tuki tests were used in this regard. According to Table 5 and considering the obtained t value, statistically significant at 1% level and based on the data in

Table 6, it can be concluded that the teachers with 17-25 years of teaching background have evaluated the obstacles to applying computer as a teaching medium significantly more than the teachers with teaching backgrounds of less than 8 years. It seems that, in the research sample, the higher the teaching background years of teachers, the more difficult using computer in teaching is perceived to be.

Table 5. One-way ANOVA test on the comparison between the viewpoint of teachers with different teaching backgrounds

Variable		Sum of squares	Df	Mean square	F	Sig
Appropriate Field	Between group	0.64	3	0.21	0.50	-
	Within group	35.61	84	0.42		
	Total	36.25	87	-		
Effectiveness	Between group	0.09	3	0.03	0.10	-
	Within group	26.30	84	0.31		
	Total	4.31	87	1.43-		
Obstacles	Between group	31.12	3	0.37	3.88	0.05
	Within group	35.43	84	-		
	Total		87			

With respect to the analysis of the third hypothesis, there is a significant difference between the viewpoint of teachers with different educational backgrounds towards the three variables of proper grounds, effectiveness of education, and obstacles. One-Way ANOVA test was used for this purpose. According to Table 6 and considering the obtained f value, statistically significant at 1% level, it can be concluded that

the teachers with a PhD degree have evaluated the grounds for using computer at schools at a more desirable level. Similarly, the teachers with a PhD degree, have evaluated the degree of effectiveness of computer as a medium of instruction at a higher level in comparison with other teachers.

Table 6. One-way ANOVA regarding the comparison between the viewpoint of teachers with different educational backgrounds

Variable		Sum of squares	Df	Mean square	F	Sig
Appropriate Field	Between group	4.32	3	1.44	3.79	0.05
	Within group	31.93	84	0.38		
	Total	36.25	87	-		
Effectiveness	Between group	2.69	3	0.89	3.18	0.05
	Within group	23.70	84	0.28		
	Total	26.39	87	-		
Obstacles	Between group	1.77	3	0.59	1.47	-
	Within group	33.66	84	0.40		
	Total	35.43	87	-		

With regard to the fourth hypothesis, there is a significant difference between the viewpoint of teachers with different majors towards the three variables of proper grounds, effectiveness of education, and obstacles. One-way ANOVA and Tuki test were used in this regard. According to Table 8 and considering the obtained *f* value, statistically significant at 1% level, it can be concluded that there is a significant

difference regarding the existence of a proper grounds for using computer between the teachers whose major is humanities and those who have graduated in basic sciences or engineering. The teachers with a degree in humanities have evaluated the ground for using computer at a lower level. On the other hand, those teachers who had studied basic sciences, evaluated obstacles at a higher level.

Table 7. One-Way ANOVA test with regard to the comparison of the viewpoint of teachers with different majors

Variable		Sum of squares	Df	Mean square	F	Sig
Appropriate Field	Between group	4.96	3	1.67	4.42	0.01
	Within group	31.29	84	0.37		
	Total	36.25	87	-		
Effectiveness	Between group	1.13	3	0.37	1.26	-
	Within group	25.25	84	0.30		
	Total	26.39	87	-		
Obstacles	Between group	4.35	3	1.45	3.92	0.05
	Within group	31.07	84	0.37		
	Total	35.43	87	-		

To analyze the fifth hypothesis, there is a relationship between existence of proper grounds for using computer and effectiveness of education, analyzed by Pearson correlation test. According to Table 9 and considering the obtained *r* value, statistically significant at 1% level, it can be concluded that there is a significant relationship between proper grounds for using computer at school and effective learning.

Furthermore, regarding the positivity of the correlation, it can be suggested that as more proper facilities and grounds are provided at school, learning would be realized better. The value of the quit patient of determination (0.39) also highlights that 39% of effective learning is fulfilled by proper facilities and grounds for using computer in educating students.

Table 8. Pearson correlation test on investigating the relationship between existence of proper grounds for using computer and its effectiveness according to teachers

Variable	R	R2	Sig
Effectiveness	0.632	0.39	0.01
Appropriate Field			

DISCUSSION AND CONCLUSION

According to teachers, there is no proper grounds for using computer optimally at schools in Tehran. This finding is in line with various studies. For example, (Becker, 2000) indicated that students in Tehran have no access to Internet at schools and their access is mainly at home, where students in northern regions enjoy more facilities. Ollé and Borrego (2010) analyzed the factors affecting the variable of the degree of using electronic journals. He found that the extent of familiarity of the members with online full text information databases, the degree of computer and network skills of users, the extent the users have access to electronic journals, the level of computer and network problems and issues, and the extent of approving electronic journals by faculty members are among influential factors. Furthermore, other factors including access, familiarity and skill, have a positive and strong relationship with the degree of use. According to the teachers of the research sample, the degree of effectiveness of education using computer is at a high level. This finding is congruent with the results of the following studies. Sharifi, Imani, and Eslamieh (2013) indicated that there is a significant relationship between organizational learning and application of communication and information technologies at Islamic Azad University,

Garmsar Branch, where this correlation was direct and positive. This finding is in accordance with the research by Hattie, Biggs, and Purdie (1996). The results of his research implied that cognitive computer intervention has had a significant effect on enhancing the performance of active memory in students with mathematical problems: both in the total score and the test subscales (Maze memory as well as forward and backward cubes). Larkin and Pines (2005) demonstrated that the students who had done their homework about online searching gained higher scores in comparison with the students in the control group. Tippins and Sohi (2003) showed that there is a significant and positive relationship between organizational learning and communication and information technologies. The teachers have reported the obstacles to using computer to be at a high level. This finding is in congruence with the results of the following studies. Based on hypothesis testing, Lund (2000) indicated that factors such as access, familiarity and skill have a positive and strong relationship with the extent of use. However, computer and network-related problems have a negative relationship with the extent of using electronic journals. The results imply that the weakest significant relationship is related to the relationship between the degree of approving electronic journals and the extent of using

electronic journals. Pouratashi and Rezvanfar (2010) found that the offset of the games electronic education in Iran's educational system are: 1) technological, 2) cultural/social 3) pedagogical 4) legal/administrative 5) the strategic and 6) economic obstacles. Mahmood (2009) showed that students at schools in Tehran have no access to Internet and they have more access at their home. The teachers who had teaching backgrounds 17-25 years evaluated the obstacles to using computer as a medium of instruction significantly more than the teachers with teaching backgrounds fewer than 8 years. This finding is in line with the results of the following studies. Liaw, Huang, and Chen (2007a) investigated the attitude of faculty members to using microcomputer in academic activities in Taiwan. He found that the variables of academic background together with computer knowledge and skill influence the effectiveness of using computer. In a research, Kline, Dyer-Witthof, and De Peuter (2003) indicated that the viewpoint of professors of technology, experiences towards using technologies, and the cultural conditions governing their surroundings have had an impact on the development of their asked to ICT at schools.

According to teachers, there is a significant relationship between using computer at schools and effective learning. This finding is in accordance with the following studies. Legris, Ingham, and Collette (2003) indicated that there is a positive significant relationship between organizational learning and application of communication and information technologies. Park and Ertmer (2007) revealed that use of technology can affect problem-solving skills in students. Sanders and Morrison-Shetlar (2001) concluded that use of computer enhances positive attitude in students to computer and school.

- Improving the quality of using computer should be done through proper access to technology and training teachers for using it effectively. Teachers should be involved in interactive dialogues with students and engage them actively in the process of learning through computer. This is because without proper training, teachers and eventually students would be disappointed. Maintenance of the devices should be done by relevant authorities on a continual basis so that no interruption occurs during teaching. Development of educational programs fitted to each major and each grade should be done professionally. The learning cycle in every major in every grade should be developed such that a way is created for regional or provincial classification. Since individuals learn differently according to their multiple intelligences, it is possible to teach them individual and specific programs depending on their abilities, so that

teaching is more useful. Students and teachers should be familiar with how to use computers and do not occupy the time of teaching. This means that if physics teacher, for example, should not teach computer. Part of the educational hours should be incorporated into lesson plan of the teacher in the form of a computer-aided lesson so that the teacher is forced to use computer programs in teaching.

- Workshops for professional development of teachers should be designed. These workshops enjoy the following characteristics: 1) provides this possibility for teachers to integrate previously-learned teachings with the current education, rather than introducing a new fashion of technology to them. 2) the training should give the teachers enough time to investigate and think about the procedure of incorporating computer technology into teaching. 3) education should have a project-based approach. 4) teachers shoot working groups given the grade they are teaching in in order to discuss various opinions and generate some projects. As Gichovi (2013) suggests, the government should equip teachers with laptops so that they face no hindrance in using and practicing what is taught.

- Since teachers with more teaching background have less familiarity with using computer in education, training workshops should be repeated every few years. As teachers with more teaching background have a custom to traditional methods, they believe less in the effectiveness of these methods. Accordingly, it is suggested that conditions should be provided so that teachers feel convenience in using new technologies. When using technology, to do favorable efficiencies at school level, it is proposed that the following points are taken into consideration. The extent of using computer a cross various lessons are different. For example, in lessons such as geology, physics, and biology, use of computer is more, but in philosophy computer may be used less. Therefore, in using this device, teachers should not be under pressure. It is better that a balance is established between choosing traditional methods and the new method of applying computer, where teachers select one given the situation and the subject matter. Teachers believe that application of experimental and practical methods in some lessons has greater effectiveness. Thus it is better not to substitute them with computer simulation. On the computer simulation enables auditory and visual learning; it does not lead to motor and exploratory learning. Most teachers tend to use PowerPoint, yet it should be noted that this instrument should not eliminate the opportunity of discussion between teachers and students (Armstrong, 2004).

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