

# Enhancing Student Learning Through Smart School Innovations

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## Abstract

*The purpose of this research is to investigate how smart schools impact the evolution and velocity of the teaching-learning process. The study was carried out using a descriptive/survey methodology, and reliable scientific websites, journals, and library resources were used as data gathering instruments. The researcher used two questionnaires to collect information from students and teachers. A 5-point Likert scale was used to produce five questions with forty subquestions for teachers and five questions with thirty-eight sub-questions for students. In four Karaj districts, there are 170 pupils and 45 teachers from clever high schools included in the sample. The findings imply that during the teaching-learning process, a greater variety of students' senses become more profound. Put another way, this method not only makes classes more efficient and makes use of a variety of software tools by utilizing the audio-visual senses, but it also gives students the opportunity to go beyond the curriculum and places more of a focus on critical thinking and deep learning. Additionally, as schools become more sophisticated, there is an increase in the amount of interaction between students and teachers. Moreover, the growing sophistication of smart schools encourages better communication between instructors and students, which makes the learning environment more interactive and collaborative. The report emphasizes how revolutionary smart schools can be in bringing education up to date and encouraging more engaging and productive learning environments.*

**Keywords:** Educational Modernization, Smart Schools, Student-teacher Interaction, Collaborative Learning, E-Learning

## INTRODUCTION

The advent of the information age and development of network-computer based technologies have caused new forms of formal and informal learning to emerge. In this regard, one of the systems that support formal education in the education system of the country is the emergence of smart schools which have provided new learning opportunities for students [1]. These types of schools have been created to compensate for some backwardness such as, inefficient methods of traditional teacher-centered teaching, lack of up-to-date and valuable textbooks and poor computer knowledge of teachers and students and also to compensate for these shortcomings and help the formation, development and

enhancement of the creative and educated forces. These schools are one of key necessities in knowledge-based societies and adopt approaches to development knowledge-based and entrepreneurial skills of students [2]. In these schools, learning-teaching processes are improved and an integrated environment for the development of key skills of students are created. Students' interest in working with computers has accelerated their learning. Teachers' motivation to incorporate technology into the teaching-learning process has also increased as a result of this interest [3]. Students spend more time to do their homework and research projects by computer and they are even busy working with

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computers in their free time. In these schools, learning is based on individual speed, collaboration, autonomy, integration between subjects and the content of the lesson is not limited to books but rather includes ebooks, multimedia software, courseware and databases and some programs have been designed for individual differences of students and their different learning styles at the same time. Since teacher-centeredness and traditional teaching are currently the basis of education system in the country, updating schools, using modern technologies, benefiting from new creativities in education and giving importance to students' capabilities require a fundamental transformation in the form and method of education [4]. The use of new information technologies has created a new potential in technology-based education which are very effective in the learning-teaching process. These technologies have also led to comprehensive and deep permanent learning. The facts indicate that the use of new technologies in the 21st century will have a profound impact on human social life. Undeniably, education is no exception in these changes. Studies on education show that information technology has been used to a great extent in the systematic education system. Therefore, it can be said that information technology is considered the most important and fundamental principle of transformation and development in today's world. The use of communication and Internet networks and virtual and electronic teaching are some of the achievements of information technology [5]. Since education is a key and stable pillar in any society, new teaching technologies are needed. E-learning, in this sense, is the most cutting-edge and successful approach to the advancement of both individual and group education. Therefore, one of the most essential skills is to find how we can develop learning in an organization. On the other hand, the most important concern of the education system in the country is the intellectual development of students and leading them to excellence and production of knowledge in this field. Therefore, the educational system of the country needs some schools that can transform education process by using information and communication technology. For this purpose, the smartization of schools, use of communication technology in the teaching-learning system, creating an efficient curriculum for students and effective teaching seem to be necessary. A smart school is also one where all administrative procedures, such as management, supervision, control, teaching-learning, educational resources and aids, evaluation, documentation, office affairs, and communications, have been developed with an emphasis on ICT (Information Technology and Communication) in order to enhance the educational and research system [6, 7]. Accordingly, it seems that the traditional method of the education system in learning and teaching leads to the loss of resources and for greater efficiency and the use of valuable educational resources, smart schools make the impacts of teaching-learning take effect effectively which can be evident in the behavior of students and teachers. Therefore, in this study, we aim to find out whether smart schools really make a difference, whether these types of smart schools that exist in our country make fundamental changes in the teaching-learning process or whether we need to make fundamental changes in the use of these types of hardware and software [8]. This study is a descriptive survey in terms of data collection methodology, applied research in terms of goal, and a correlational one in terms of the links between variables. The area of study of this research is related to the discussions of the Ministry of Education on smart schools and high schools in the city of Karaj in Alborz Province and the survey has been conducted through distribution of the questionnaire.

### **Statement of the Problem**

Information technology has been proposed as the most important and fundamental principle of change and development in today's world. The use of communication networks and the Internet and virtual and electronic training are the achievements of information technology. Given that education is one of the main and stable pillars in any society, therefore, there is a need for new technologies to provide education. In this sense, one of the newest and most successful approaches to the advancement of both individual and group education is electronic education. Therefore, one of the most important essential skills is how to develop Yagiri in the organization. Changing behavior is considered as the most basic element of learning. Learning is a process in which people's behaviors and mental models change. Direct or indirect experience can lead to learning, which is a generally permanent change in behavior or potential behavior. Of course, learning is important at different individual, group and organizational levels. That is, in learning, people learn to take advantage of each other, learn new things, and try to complement each other. The new electronic educational system brings unique benefits and

advantages for individuals, organizations and educational centers. The trend of the current century is such that traditional education cannot meet the current needs of students, so a new type of education should be introduced in this field. For some time, some countries in the world have started to establish electronic schools or smart schools. In smart schools, computers affect the way of teaching and evaluation, while the social performance of schools remains strong [9]. In order to enhance the research-oriented educational system, a smart school is one in which FAVA serves as the foundation for all implemented processes, including management, supervision, control, teaching-learning, educational resources and assistance, evaluation, documents and office affairs, communication, and the foundations of their development. This kind of educational system, by overcoming the one-centered nature of education that is usually provided by the teacher to the student and the students are also obliged to maintain the same concepts, by using the diversity of educational resources and content, has a significant effect on the ability of learners. Therefore, in this research, considering the schools of Karaj (areas 1 and 2) as a statistical population, we intend to reach the conclusion that the strategic plan of smartening schools, which is one of the basic strategies of the fundamental transformation of education, has an effect on the learning-teaching of students. Considering that we know that the teacher plays a key role in this program, the book has its own place and goal setting for students, teachers and parents (family) has been emphasized [10].

### **Significance of the Study**

Organizations are attempting to hire people who go above and beyond the call of duty in order to compete in the global marketplace, satisfy customers' needs and expectations, and adjust to the ever-changing nature of work. This is because it is thought that these extracurricular behaviors show up in performance reviews, influence employees' involvement in programs, and have a positive impact on self-esteem, job engagement, and organizational commitment. These days, actions that go above and beyond what is expected of self-driven, conscious employees are called organizational citizenship behavior in management literature [11]. Through instilling motivation, self-awareness, and self-assurance, transformational leadership leads to exceeding expectations in work output. To put it another way, transformational leadership creates cultural circumstances that allow for the most successful organization. As stated by Yaqoubi et al., a number of studies demonstrate the clear need to shift toward corporate citizenship behavior in relation to transformational leadership [12]. Since these structures are cited as important organizational behavior structures in the research and background, studying transformational leadership with employee citizenship behavior is essential. Owing to the inability of organizations in today's complicated and highly variable environment to adequately communicate the demands and requirements of the necessary job, organizational citizenship behavior—beyond the function in these organizations—becomes extremely necessary. The municipality is a government organization that provides its residents with a variety of public services [13]. These services include building roadways, public spaces, and walkways; disposing of trash; attending to the health needs of the populace; performing civil works; beautifying the city; and providing other urban services. Given that the efficacy and efficiency of these organizations are significantly impacted by the leadership and civic conduct of their members, an examination and analysis of the conduct of municipal employees can serve as a foundation for enhancing employee motivation concerns [14]. Additionally, because the municipality is a public institution and must budget heavily for its connected activities, using organizational citizenship behavior and staff assistance will improve the effectiveness and performance of the organization. Additionally, municipal managers will strengthen this conduct and attain superior performance by being aware of the status of organizational civic behavior exhibited by their workforce [15, 16].

### **The Importance of the Research**

Attaran believes that the need to keep pace with technological developments and human sciences is an urgent need for education today, and currently, studies show that the use of computers can help students' self-understanding and socialization [17]. For this purpose, smart schools and the use of information and communication technology in the learning-teaching system and consequently,

formulation of efficient curriculum for students in such schools increase their motivation in learning. The entrance to the field of information field and the promotion of global network-based and computer-based technology have led to the creation of new learning environments [18]. According to the document of fundamental transformation of education based on Horizon 1404, chapter 6, paragraph 7 (a clever utilization of modern technologies in the official public education system in the Islamic Republic), promotion of the quality of education process based on the clever use of new technologies (1, 2, 3, 7) and on the other hand, according to the strategic plan of comprehensive IT system of the country, that emphasizes upon the facilitation of formal education based on information technology in schools with the development of Internet networks, smart schools and enhancement of technology-based education system of big and small high schools and colleges, according to the 20-year perspective to achieve first place in economic, scientific and technological fields, according to software movement and the fifth development plan in paragraph 19, the government must include information and communication technology in all process by the end of the plan to achieve educational equity electronically [19]. On the other hand, in ICT document of the Ministry of Education and comprehensive scientific plan of the country, an emphasis has been put on the development of e-learning system and IT infrastructure in the field of higher education. According to what previously mentioned, this study aims to examine whether smart schools will improve the learning-teaching process or whether they will contribute to educating the elite through an accurate and scientific approach [20].

### Research Objectives

1. Examining the weaknesses and strengths of smart schools in terms of software and hardware
2. Further expansion of such schools in the direction of science production
3. Increasing the participation of school related elements (parents, teachers and students) and providing the possibility of their interaction.
4. Improving effectiveness and increasing efficiency in the formal education system with the development of information and communication technology
5. Increasing the effectiveness of the family in the teaching-learning process
6. Creating a dynamic and attractive environment for the full flowering of talent and individual creativity
7. Providing a teaching-learning environment and its continuity inside and outside the school
8. Continuous development of scientific and professional abilities of educators using new educational trends
9. Doing research activities as a team
10. Changing the basis of education to learning based on research (Ministry of Education, transformational strategy)

### Hypothesis

1. There is a significant relationship between making schools smarter and the amount of educational technology used by teachers.
2. Making schools smarter and teachers' digital literacy are significantly correlated.

### Research Methodology, Statistical Society, Sampling Method and Data Analysis Methods and Tools

The current research is descriptive in terms of its purpose and in terms of the method of collecting descriptive information, and the scope of this research is the discussions related to smart schools that have been conducted in Alborz Education Organization and in several smart schools. Karaj City high school students make up the research's statistical population, and a random sample procedure was used. Inferential statistics method was used to analyze the obtained data and the statistical method used is correlation coefficient and SPSS software.

### Data Collection

Data collection tool is a questionnaire that has been designed based on Likert five-point scale and is

distributed among students and teachers. Descriptive and inferential statistics have been employed in this work to examine the data gathered from samples. In statistics, correlation coefficient and Friedman variance analysis have been used and SPSS software has been used for data analysis. Statistics, both descriptive and inferential, are used in data analysis.

### **Descriptive Statistics (Students)**

The data collected from the students' questionnaire is presented in Table 1:

According to the research findings, the sample includes 64.7 percent of male students and 35.3 percent of female students. As it is shown, 48.8 percent of students under study were studying mathematics, 49.4 percent were studying science and 1.8 percent were technical and vocational students. Also, 34.7 percent of students were studying in District 1, 46.5 percent were in District 2, and 18.8 percent of them were in District 3 of Karaj. 93 percent of students stated that they had personal computers at home, and only 7 percent did not have a personal computer at home. About 70 percent of students had access to ADSL Internet at home. In the meantime, 17 percent had other forms Internet connection and only 3.5 % of students used Dial up Internet. It was also found that 8 percent of students did not have access to the internet at home.

Table 2 indicates the status of the level of computer use at home. As you see, 8 percent of students stated that they do not use a computer at home. 42 percent use a computer for less than 1 hour per day, 30 percent use it for 1 to 3 hours, and 17 percent use it 3 to 5 hours a day. It was also found that 1.3 percent of students use computer more than five hours a day.

**Table 1.** Frequency Distribution of student community features

Total number	Frequency		
170 people	7/64	male	sex
	3/35	female	
	8/48	mathematics	Field of Study
	4/49	science	
	8/1	humanities	
	7/34	District 1	educational District
	5/46	District 2	
	8/18	District 3	
	9/92	PC	The status of having PC
	1/7	Lack of PC	
	5/3	Dial up	Internet connection
	6/70	ADSL	
	6/17	Other internet connections	
	2/8	No internet connection	

**Table 2.** Frequency distribution of the status of Access to Internet

Students				Field of study
Cumulative percentage	Valid percentage	Percentage	Frequency	
8.8	8.8	7.7	14	Not using
50.6	41.9	36.8	67	Less than hour
81.3	30.6	26.9	49	1 to 3 hour(s)
98.8	17.5	15.4	28	3 to 5 hours
100.0	1.3	1.1	2	More than 5 hours
	100.0	12.1	22	No response
		100	170	total

**Table 3.** Frequency distribution of features of teachers' community

Total number	Frequency %		
45 people	8/57	male	sex
	2/42	female	
	7/6	principal	position
	2/2	instructor	
	4/84	teacher	
	7/6	student	
	8/57	District 1	Educational district of teachers
	9/28	District 2	
	1/11	District 3	
	2/2	District 4	
	2/2	associate	Teachers' degree of education
	60	B.A.	
	8/37	M.A.	
	3/93	High's school	Teaching level
	7/6	Vocational school	
	1/11	Less than 10 years	Educational experience
	8/57	10 to 20 years	
	1/31	More than 20 years	
	9/8	Less than 35 years	age
	1/71	35 to 45 years	
	20	More than 45 years	
	100	PC	Having PC
	0	No PC	
	4/84	ADSL	Internet Connection
	7/6	Dial up	
	9/8	No accesses	
	4/84	Internet	Participate in educational courses
	80	Excel	
	4/84	Windows	
	9/88	Word	
4/84	PowerPoint		

**Descriptive Statistics (Teachers)**

The data collected from students' questionnaire is presented given in Table 3:

Based on the research findings, there are 42.2 percent female instructors and 57.8 percent male teachers in the sample of teachers. Also, of it includes 6.7 percent of principals, 2.2 percent of teachers, 84.4 percent instructors and 6.7 percent of students. 57.8 percent of teachers were teaching in the first district of education system, 28.9 percent were teaching in the second district and 11.1 percent were teaching in the third district of education system in Karaj. Moreover, 1 person equal to 2.2% of the sample was teaching in District 4 of Karaj education system. Most of the teachers or 60 percent of teachers had bachelor's degree, 37.8 percent of teachers had master's degrees and finally only 2.2 percent of them had associate degree. In addition, 93.3 percent of teachers under study were teaching in high school and only 6.7 percent were teaching in technical and vocational schools. As it is obvious, 11 percent of the sample under study had less than 10 years of teaching experience, 57.8 of teachers were teaching for 10-20 years and 31.1 percent were working for more than 20 years. The average teaching experience of teachers was also 19 years. Mean: 19, SD: 5.74, Min: 5, Max: 29

On the other hand, 8.9 percent of the sample were less than 35 years old, 71.1 percent were 35 to 45

years old, and 20 percent were more than 45 years old. The average age of students was 41.67. Mean: 41.67, SD: 4.61 Min: 29 Max: 50.

All teachers had personal computers at home and about 84.4 percent of teachers had access to the ADSL Internet at home. Only 6.7 percent of students use Dial up Internet. Additionally, it was shown that 8.9% of educators lack home internet access. Besides, as it is clear, a maximum of them, 88.9% percent, participate in Word courses and a minimum, 80 percent of them, participate in Excel courses.

### Analytical statistics

The first hypothesis of the research

*H1*: The amount of instructional technology used by instructors and the intelligence of schools are significantly correlated.

*H0*: The quantity of instructional technology used by instructors and the intelligence of schools do not significantly correlate.

In this research, in order to investigate the impact of school smartness on the amount of use of educational technology by teachers, students were asked, and the results were analyzed. Table 4 displays the findings from the seventh research hypothesis test. According to the results of the table and the level of significance, it was found that the smartening of schools has a positive effect on the amount of use of educational technology by teachers.

The second research hypothesis

*H1*: There is a strong correlation between teachers' computer literacy and the intelligence of the schools.

*H0*: The computer literacy of teachers and the intelligence of schools are significantly correlated.

Table 5 displays the findings from the sixth research hypothesis test. The table's data and degree of significance indicated that there is no relationship between teachers' computer literacy and school smartening.

Factor analysis of the barriers to the development of smart schools from the teachers' point of view. In order to identify the factors influencing the development of smart schools from the perspective of teachers, the selected variables are included in the factor analysis and based on the collected data, KMO value is equal to 0.683 and Bartlett's test value is equal to 624.78 which is significant in 0.01 level and show that the data is suitable for factor analysis. There are 6 variables extracted from 21 variables. Table 6 shows the factors and special values of each one of them.

**Table 4.** One-sample t-test results of the first research hypothesis

Test Value = 2.5					
Confidence level 95%		The mean of differences	Significance level	Degree of freedom	value t
High	Low				
0/4963	0/2507	0/3735	0/000	169	6/005

**Table 5.** One-sample t-test results of the first research hypothesis

Test Value = 2.5					
Confidence level 95%		The mean of differences	Significance level	Degree of freedom	value t
High	Low				
0/221	-0/237	-0/0079	0/945	44	-0/070

According to the information in Table 5, maximum special value is related to the first factor, about 4.17% which in fact, 19.87% of the described variance is due to this factor. In general, 6 extracted

factors could describe 75.83% of the total variance. According to results, the factor of educational structure of the country is the most significant obstacle to the development of smart school from the teachers' perspective. The variables included in the analysis were rotated through Varimax method and the factors related to each one of them were identified and named which is shown in Table 6. However, it should be noted that after the rotation, some variables were excluded from the analysis due to low factor loading (less than 0.5) and due to insignificance of their correlation with other variables. The reason why these variables were excluded from the analysis is that the interface between these variables were already covered by more important variables. Thus, the above-mentioned variables can be summarized in other variables as shown in Table 7.

**Table 6.** Extracted Factors with special values, percentage of variance and the percentage of their Cumulative variance.

The cumulative frequency of variance percentage	Variance percentage of special value	Special value	Factors	Row
87/19	87/19	17/4	First factor	1
04/38	17/18	81/3	Second factor	2
79/53	74/15	30/3	Third factor	3
06/62	27/8	73/1	Fourth factor	4
68/69	62/7	60/1	Fifth factor	5
83/75	14/6	29/1	Sixth factor	6

**Table 7.** Variables related to each factor and the level of coefficients obtained from Rotated matrix.

Factor loading			Components	
	.887		Teaching method in Iranian educational system is an obstacle to learning through multimedia	Educational structure of Iran
	.821		Not considering enough time for teachers and students to study is an obstacle to learning through multimedia.	
	.716		Strict bureaucratic regulation in the education system is an obstacle to learning through multimedia	
	.681		The method of evaluation of teachers in Iranian educational system is an obstacle to learning through multimedia.	
	.633		Futility of multimedia in annual evaluation of teachers who used them compared with those who did not	
	.572		Iranian education system's too much support for traditional methods is an obstacle to development of learning through multimedia	
	.804		Lack of facilities and necessary technical infrastructure (high-speed Internet, internal network, etc..)	Technical Infrastructure
	.779		Insufficient number of computer and other required accessories in school	
	.772		Financial inability of schools in the preparation, protection and maintenance of hardware and software equipment	
	.754		lack of CD and appropriate and specialized and educational software available to teachers at school	
	.730		Lack of good space equipped with computers, projectors and other necessary equipment (computer workshops or special classes)	
	.825		. Commitment of teachers to use traditional methods in education	Motivational
	.754		Teachers' resistance to use new multimedia	
	.725		Lack of enough motivation among teachers	
	.713		the lack of proper criteria for students' assessment due to using multimedia	

Factor loading				Components	
	.840			Low salaries and benefits decided for teachers is an obstacle to learning through multimedia	Economic problems
	.616			Insufficient time for using multimedia in the classroom by teachers	
	.847			Lack of enough knowledge and skill in teachers	Information knowledge
	.609			The impossibility of using electronic devices and tools in accordance with the school requirements due to teachers' lack of knowledge	
	.913			The content of textbooks in Iran does not allow education using multimedia	Course content
	.726			The method of assessment of students in Iranian educational system is an obstacle to learning through multimedia.	

## CONCLUSION

In reviewing the conclusion for the seventh hypothesis of the research entitled: There is a substantial association between the smartness of schools and the amount of educational technology used by instructors. It was discovered that instructors' use of instructional technology is positively correlated with schools' intelligence.

In the examination of the result for the eighth hypothesis of the research titled There is a significant relationship between the smartization of schools and the computer literacy of teachers, it was found that the smartization of schools does not affect the computer literacy of teachers.

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## Conflict of Interest

The authors declare no conflict of interest.

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