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META-ANALYSIS OF THE RELATION OF INFORMATION AND COMMUNICATION TECHNOLOGY WITH ACADEMIC ACHIEVEMENT

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ABSTRACT
In this research, the role of information and communication technology is meta-analyzed with the academic achievement. The whole aim of this research is to identify the role of information and communication technology with academic achievement. For achieving the above research aim, four research questions were set forth. In order to execute the study, as many as 16 researches were collected. The statistical method which was used in this study has been meta-analyzed. The results of meta-analysis showed that the variable of information and communication technology with academic achievement has a meaningful relationship. The obtained results confirmed this issue to the effect that those who have dealt with the method of teaching by use of the various technologies of information and communication, their students have obtained good and acceptable scores.

Key Words: *Meta-Analysis, Information and Communication Technology, Academic Achievement.*

INTRODUCTION
There is no doubt that whenever there is talk about the method of the scientific research in a special class of human science, the mind of each researcher at first notices thinking in a scientific manner. Meta-analysis can save various and different research reports, suspended and left without usage literature library archives, organizational research centers and administration from dispersion. There is no doubt in this affair that the combination of the results and the usage of the previously carried out researches (as an analysis unit) for obtaining a general picture without ambiguity from a subject is by far more useful and efficient than the description of the new research designs in that subject.

Therefore, meta-analysis is an exact method for purposeful combination of the results of the various informations for obtaining a better estimation regarding the facts. In other words, meta-analysis is consisted of the following items:

- A widespread search for all existing evidence.
- Applying clear standards for determining generalized articles.
- Determining an effect sizes of cross studies until obtaining a general estimation of the outbreak or the effect of a behavior (Streinger, 2003).

The prediction of the educational progress of learners has always been under the attention of experts and researchers of this field. One of the fields of this subject is the investigation of factors in connection with education development. This field considering the importance of the educational development and also the main weakness of learners in this field has resulted into several widespread researches.

Domestic and Foreign Carried Out Researches
Karimi *et al.,* (1388) reported in a research under the title of the perspectives of the application of information and communication technology in the teaching process that the category of input process is not considered a perspective, but individual and organizational results more than the average level are considered a perspective from the view of the professors and students in complementary education in Isfahan and Sanati universities.

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The research of A'Alam-Al-Hoda *et al.,* (2010) concluded that with application of information and communication technology even the ethical approach of students in the junior high school, although virtual communication skills are more effective on the approach of male students in junior high school and can conclude that applying information and communication technology over the ethical approach of boy students is in general impressive, but since the ethical approach has itself ill of ternate of cognitive, affective and preparative performance, the effects of the factor of information and communication technology, namely virtual communication skills in related with merely two affective, ethical values level and preparation for performance towards ethical values and doesn't have meaningful effect towards the cognitive level of ethical values.

The research which Farhani and colleagues (2008) conducted the title of information and communication technology and its performance with educational performance and job future of physical education students showed that the knowledge level of the most students from information and communication technology is poor, and attention and planning of most students towards their job future are in the middle level, and also there is positive and meaningful relationship between the knowledge level of information and communication technology and educational performance of the students, but there is not observed a meaningful relation between the knowledge of information and communication technology and students' job in future.

Bioshop and Parkinson (2008) concluded in a study under the title of; students' approach to science when they are entered to high school with low facilities of technology from primary school with an enriched environment of technology that although the high school students had difficulty because they did not have enough access to computers and other information and communication technology, but by assay of science teachers they could enjoy the course.

Post Holm (2004) in an article under the title of; the role of the teacher on the students' group work when they are doing homework by use of the information and communication technology; investigated its role and difficulties which teachers are facing with them while they are working. The results of this research in three Norwegian schools showed that the information and communication technology provides widespread facilities for schools, but the role of the teachers are changed in these schools and they must spend more time in comparison with the ordinary classes. Teacher has the role of counselor in these classes and helps the students through discussion with reducing support in making construct and organizing learning activities. The results of the research also showed that the information and communication technology doesn't have the role of teacher and is a catalyst for establishing relation between teacher and student.

The researchers has pointed out on the affirmation of the effect of some of the special technologies on the scientific level of the students' that there has been a positive relation in using of computers for learning different games on the students of four grades of primary school on their scores in mathematics course, and also this relation has been affirmed in using of information and communication technology for teaching skills that required a high level of thinking with score in mathematics in the second grade of the junior high school. Venglinski, (1998) has collected the information obtained from the carried out researches in America between the scientific level of students and their use of computers in different games and the information analysis in different age groups has confirmed this relation (National center of teaching statistics, 2002). On the research carried out on the students of 462 schools in America, most teachers of these schools had used the technology for providing real teaching milieu which deals with the solving of the existing difficulties in the real world of the students. In these schools, students in different time stages had dealt with the execution of the projects which working with them required the knowledge of some different subjects of courses. In these classes, the appraisal system of student had somewhat changes which they were estimated by their activities (which usually collected in their teaching records). These results play the basic role in the support of the teaching methods (Minz and Owosen, 1995). The carried out studies (since year 1992 up to year 1998) on teachers and students of nine and ten years old in 23 classes of 16 countries has shown that since the students have started the use of information and

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communication technology, they deal with complicated acts like analyzing the difficulties estimating their deeds and compiling suitable questions. Besides, researchers and teachers have reported that the students apply new strategies for cooperation with their peers and friends, their teaching is conjoined with motivation and they enjoy high self-confidence in doing things (Cozma, 2002).

Meta-analysis or quantitative methods of the combination of the carried out researches in fact is resulted from a crisis of cognitive method in behavior sciences, social sciences and medicine and is a reaction towards the despairing conditions of cognitive method and its main supporter in these kind of researches in the second half of the twentieth century (Arizi, 2010).

The phenomena under the study of social science, because of this reason that human being is the main subject of the research, it is more complicated to explain them in a framework of a single study. In addition to it, the ability of the control of the research milieu, the subjects sample and the method of usage may be different from one research to another (Wolfe, 1986).

Meta-analysis is a statistical analysis of a great series of the results of single studies with the aim of integration of findings (Glass, 1976).

Information and communication technology which is itself a new field of study and has confronted seriously with the methods of traditional teachings will have main effects on all educational fields of learning and research especially in universities. Recent developments in Information and communication technology, entry and emergence of local, national, district and international information networks specially internet, multimedia, communication technologies, have offered new methods for designers, programmers and the executives of the educational programs (Pour Mohammadbagher and Colleagues, 2009).

Meta-analysis process is more than a statistical technique, it is a methodology for the investigation of the systematic series of researches, the exact formulation of hypotheses, execution of a comprehensive search, recording and maintaining of the statistical combination of data and the sizes of the effect obtained from various investigations, the search for modulators for the explanation of desired effects and reporting the results (Sohrabifard, 2007).

The term of information technology contains new technologies like computers, fax, micro-electronics, telecommunication and also older technologies like the systems of filing the documents, mechanical calculating machines, printing, engraving and etc. Though, this is a new term, but in conceptual term, its age is as old as the human desire for establishing communication (Behan, 2003).

Psychologists are seeking for the most complete theories and opinions which explain the motivation and cognition of learners. Obtaining such demands require more knowledge, understanding and awareness towards teaching and motivation phenomena and in other words without cognitive and motivation processes, obtaining such insight without thinking and research or intellectual and feasible investment is impossible (Nekoi, 1378).

In terms of instantaneous increasing in the use of meta-analysis, Field (2001) reported that between years 1981 up to 2000, as many as 2200 of scientific research articles have been carried out in valid journals by use of meta-analysis or they have had a discussion about meta-analysis, so that out of these numbers more than 1400 cases during the year of 1995 and more than 400 cases during the year of 2000 have been published and this issue emphasizes the importance of the meta-analysis (Field, 2001).

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Meta-analysis, because of its inherent abilities in extraction of relatively answers from research backgrounds through providing answer for clinical question in them providing exact answers is not possible because of the presence of the conflicting research findings, probably has caused significant differences in the patients' life. For example, through meta-analysis, open heart surgery against medication in the disease of the heart anemia was determined in rate of mortality, which the mortality

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resulted from the open heart surgery was 10.2% and as of medication was 15.8% respectively (Youesf *et al.,* 1994).

Also the meta-analysis of more than 200 studies about violent movies in television showed that the individuals after watching television showed more tendencies for anti-social actions and aggression (Payack and Camstac, 1994).

Homan has analyzed the characteristic of the meta-analysis as follows:

Meta-analysis is not tied to a special statistical method and in fact has a quantitative and multimethod nature. Besides it contains a method or methods through which can prove something. In fact multi-analysis is not a target but is a policy for reaching researcher's specialized aims.

In meta-analysis, it is not prejudged about the quality of the research or researches under retrospection. Its analysis unit is the individual studies of researchers which are done in connection with a subject. The aim of the meta-analyzer is the comparison of the studies in view of the obtained results and combining those results in order to obtain a whole impression and associated with reality. This is a multi-stage and multi-level process in which at first the information is extracted from the primary research source, then combines and integrates with each other and finally a new whole is obtained. Therefore, statistical unit in meta-analysis is a previous carried out research.

Meta-analysis in fact is a kind of combination and not an analysis. Because, combination and integration of components such as data, information, concepts, theories and etc. are referred as a new thing (a whole), while analysis contains often analyzing or breaking a whole for studying its components (Homan, 2009).

The main advantages of the applying of Information and communication technology in the world systems of the education in the course of the increasing of the rate of development are as follows: increasing the communication channels through tools like e-post discussion groups, talking rooms, ample flexibility regarding when and where professors and students do their duties (Ravat and Ravat, 2006); Development of the learning methods facilitation of teaching planning and planning of the educational subjects; increasing and improvement of the educational reports of learners to their parents, improving parents' abilities and learners' talents and also making them aware of the learning and teaching process (Jalali and Abbasi, 2005).

Research Questions

- How many is the numbers of studies with the subject of the usage of Information and communication with academic achievement?
- Which kinds of tests are used for investigation of each of the hypothesis?
- Is there a relation between the application of Information and communication technology with academic achievement?
- How much is the rate of the effect size of information technology on academic achievement?

Method of the Research Execution

The method of the research execution is mainly meta-analysis. In meta-analysis at first, the information is extracted from primary resources, and then they combine with each other and finally a new whole is obtained.

The statistical universe of the present research contains as many as 28 theses at the M.SC level and also the researches which have been carried out by the executive organizations and researches which have been published in valid scientific, research and scientific, propagative journals and their subject has been the relation between self-efficiency with academic achievement, and in the statistical sample of the present research by snow ball sampling method as many as 16 articles and theses were chosen. In this research in order to provide the necessary information out of a checklist was used for collecting information considering the words of the research questions in the field of the relation of self-efficiency with academic achievement. In meta-analysis, the main principal consists of effect sizes for separate studies and changing them into a common matrix (general) and then combining them for obtaining a middle effect (average).

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Findings
Descriptive Analysis Question 1:
(How many is the number of the studies with the subject of the application of information and communication technology with academic achievement?).
The numbers of the studies under investigation is 16 studies, which is presented and determined in Table 1.

Table 1: Frequency of theses and articles under used in meta-analysis

	Row Studies Frequency %		
1	Theses	14	87.5
2	Article	2	12.5
	Total	16	100

Descriptive Analysis Question 2:
(Which kinds of tests are used for investigation of each of the hypothesis?).
For the investigation of the each of the hypotheses, the statistical test 8 is used which is presented and determined in Table 2.

Table 2: The frequency rate and percentage of carried out researches on the basis of statistical method used.

	Statistical Method	Frequency Frequency %
Chi-Square	3	18.75
Independent T	7	37.5
Pierson Correlation Coefficient	1	6.25
Variance Analysis and Independent T	2	12.5
Chi-Square and Variance Analysis	1	6.25
Correlation Coefficient	1	6.25
Chi-Square, Chi-Square	1	6.25
Spierman Correlation Coefficient		
Total	16	10

The results of table number 2 show that 18.75 of researches has used chi-square statistical test, 37.5% of researches has used statistical test of independent t. 6.25% of researches has used statistical test of Pierson correlation coefficient t, 12.5% of researches has used variance analysis test and independent t, 6.25% of researches has used Pierson correlation coefficient test and independent t, 6.25% of studies have used chi-square and variance analysis, 6.25% of researches has used Spierman correlation coefficient test, 6.25% of researches has used independent t test, chi-square, Spierman correlation coefficient for analysis of data. Most researches have used independent t test and chi-square and the least researches have used Spierman correlation coefficient test, independent t, Chi-Square and Pierson correlation coefficient.
Information Analysis of Question 3:
(Is there a relation between the application of the information and communication technology with the academic achievement of students?).
Statistical analysis of this question by use of software of comprehensive meta-analysis V^2 was carried out by the method of the combination of the effect size and has collected in the 16 studies (Table 3), which

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were in the field of the effect of information and communication technology on the academic achievement of students and are determined in Table 3.

Table 3: The relation of the application of the information and communication technology with the academic achievement in each 16 studies.

Row	Researcher	Effect Size	Low limit	High limit	Z Level	P Level
01	Motamedi (1388)	0.246	0.100	0.609	3.035	0.002
02	Ansari(1387)	0.211	0.078	0.572	3.059	0.002
03	Mohammadi(1386)	0.198	0.065	0.603	2.852	0.004
04	Vahdati(1389)	0.201	0.082	0.497	3.477	0.001
05	Maleki(1387)	0.230	0.098	0.543	3.357	0.001
06	Nazeri(1389)	0.378	0.150	0.952	2.063	0.039
07	Ghorbani(1388)	0.119	0.035	0.402	3.420	0.001
08	Rezaee(1387)	0.134	0.042	0.432	3.366	0.001
09	Abbasi(1386)	0.144	0.058	0.360	4.144	0.000
10	Bagheri(1388)	0.090	0.034	0.238	4.837	0.000
11	Naderi(1387)	0.268	0.109	0.661	2.858	0.004
12	Fathi(1387)	0.020	0.080	0.507	3.399	0.001
13	Saeedi(1388)	0.336	0.107	1.057	1.865	0.062
14	Ahmadi(1389)	0.226	0.086	0.597	3.003	0.003
15	Azizi(1387)	0.148	0.061	0.362	4.184	0.000
16	Zamani(1388)	0.206	0.042	1.009	1.948	0.057
Fixed Combination Effects		0.199	0.155	0.255	12.782	0.000
Random Combination Effects		0.199	0.155	0.255	12.782	0.000

Table 3 shows that in only 5 studies out of 16 studies, their meaningful levels has been more than 0.05 and as a result are meaningless and the rest are meaningful with a confidence of 0.95%. Also the Table 3 shows that both the fixed combination effects and random combination effects are meaningful at the level of 0.05.

Table 4: The meta-analysis of the application of information and communication technology with academic achievement.

The Question of Research	Number of Studies	Fixed Combination Effects	Random Combination Effects	Variance Explained	Confidence Distance 95%	Consistency Test: Volume x^2	Liberty Degree x^2	Meaningful Level x^2
Information Technology Academic Achievement	16	0.199	0.199	0.009	0.155	8.053	15	0.000
					0.255			0.000

The results obtained from the Table 4 shows that the average of the effect size (random combination effects) of the relation between information and communication technology with academic achievement in the sample under research is 0.199, and the information and communication technology at the rate of 0.009 of the variable variance predicts the educational performance. Since the estimated effect size is in the area of the effect size confidence, thus the relation between the information and communication technology is confirmed. Also the test of all of them has meaningful values and there is a possibility this being in consistency is because of the presence of the intervention variable between these two variables.

Inferential Analysis of Question 4:

(How much is the effect size of information and communication technology and professional development?).

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The statistical analysis of this question was carried out by the use of the software of comprehensive meta-analysis V^2 and by the combination method of effect size. For this test of research question as many as 16 studies are determined which their effect size is presented in Table 2.

Table 5: The rate of the effect size of information and communication technology on academic achievement

Row	Researcher	Effect Size	Z Level
01	Motamedi(1388)	0.24	3.035
02	Ansari(1387)	0.211	0.059
03	Mohammadi(1386)	0.198	2.852
04	Vahdati(1389)	0.201	3.477
05	Maleki(1387)	0.230	0.357
06	Nazeri(1389)	0.378	2.063
07	Ghorbani(1388)	0.119	3.420
08	Rezaee(1387)	0.134	3.366
09	Abbasi(1386)	0.144	4.144
10	Bagheri(1388)	0.090	4.837
11	Naderi(1387)	0.268	2.858
12	Fathi(1387)	0.201	0.399
13	Ahmadi(1389)	0.226	3.003
14	Azizi(1387)	0.148	4.184
15	Zamani(1388)	0.206	1.948
Total		**0.199**	**-12.782**

Table 5 shows that the rate of the effect of the information and communication technology on the students' academic achievement is equal to 0.199 and the obtained level of Z level for this effect size is equal to -12.782, therefore information and communication technology on academic achievement is effective.

DISCUSSION
There is an attempt in this research that by use of meta-analysis, the effect of information technology on academic achievement is determined. In meta-analysis, at first, information is extracted from primary resources and then combines with each other and finally a new whole is obtained. In the method of researcher's meta-analysis, which registration of characteristics and mass findings from researches in quantitative format, they become prepared for the strong statistical methods.
In order to execute this study, a checklist for collecting the relevant information for carried out researches regarding the subject is provided which considering the key variables, hypotheses and research questions were used. With the number of 28 carried out researches regarding the present study which at first has been carried out by the snow ball sampling method, but considering the method used in this research to the effect that merely articles and theses were chosen which in terms of cognitive method and referring to the most centers of research sampling obtained confirmation.
The method of the research execution in view of theoretical considerations and methodology is carried out with a special arrangement. The approach used in this research is on the basis of Hunter and Smith's approach (1977). The framework of this research is r (correlation), and the present research also has used

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correlation, and also this approach supports random measuring method which is according to this research.

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