

Assessment and Comparison of ICT' Literacy between Teachers and Students in Iran's Secondary Schools

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Abstract: The major goal of this study is to “assessing and the comparison ICT’ literacy between teachers and students in Iran’s secondary schools”. A group sample of teachers, 367 and a group sample of students, 390, was selected through simple random sampling method. The research method was survey method. To study goals of the research, two instruments, questionnaire and interview were used to compare and evaluate ICT literacy. To analyzed results taken from descriptive statistics and inferential statistics, chi-square test and two dimensional tables were applied. The results showed that out of 757 respondents, 68.7 percent were Skillful in data retrieval, 66.4 percent were skillful in the field of data application and classification, 51.3 percent were qualified in data representation and interpretation, 53.5 percent were Skilful in data quality and utility judgment and 42.8 were qualified in data designing and creation. Inferential statistics showed that there was a meaningful difference between teacher and student ICT literacy in 5 components and also showed that student literacy was higher than teachers’ literacy in 5 components.

Key words: Information and communication technology • ICT literacy • Information literacy • ICT literacy skills

INTRODUCTION

ICT is indispensable and have been accepted as part of the contemporary world especially in the industrialized societies. In fact, cultures and societies have adjusted to meet the challenges of the knowledge age. So, the pervasiveness of ICT has brought about rapid changes in technology, social, political and global economic transformation. However, the field of education has not been unaffected by the penetrating influence of information and communication technology. Unquestionably, ICT has impacted on the quality and quantity of teaching, learning and research in teacher education. Therefore, ICT provide opportunities for teachers and students to communicate with one another more effectively during formal and informal teaching and learning [1]. In the same vein, teachers need training not only in computer literacy but also in the application of various kinds of educational software in teaching and learning [2]. Furthermore, they (teachers) need to learn how to integrate ICT into their classroom activities and school structure. The quality of teachers is known in virtually all countries to be a key predictor of student

learning [3, 4]. Therefore, teacher training is crucial using ICT, because ICT are tools that on the one hand can facilitate teachers training and on the other hand help them to take full advantage of the potential of technology to enhance student learning [5]. Correspondingly, ICT have introduced a new era in traditional methods of teaching and offering new teaching and learning experiences to both teachers and students. Hence, education environment should take advantage of this capability to provide easy access of information, since technologies enable the visualization of educational materials in an innovative and realistic manner [6]. Correspondingly, In her recent article in Change magazine, Patricia Senn Breivik, a noted author on the subject of information literacy, argues that even with a wealth of information available to them, today’s graduates are not more adept at information skills or more informed than their less information-rich predecessors: “What is growing ever more obvious is that today’s undergraduates are generally far less prepared to do research than were students of earlier generations, despite their familiarity with powerful new information-gathering tools” [7].

One study was conducted in 1998 for determining teacher's special needs from students' preparation point of view for effective using of information and participation to facilitate information resource based learning in New Zealand. Results showed that although teaching information skills in schools is very necessary, but it is not included in curriculum appropriately and even though trainers' value information skills, but they haven't enough knowledge about it and ICT literacy is not supported in schools. Studies show that although with present policies, literacy education is necessary in schools, but its execution is very difficult without appropriate program for teacher's professional progress and collaborating with other people like primary schools' librarians [8]. In the study, Yangen *et al.* [9] have conducted a case study in primary schools of Hong Kong in an article named "The effect and role of information technology" to show that how economic and social changes and information and communication technology pressure affect on Hong Kong schools and their students daily practice. They found that teachers and principals should be familiar with ICT application and development concept nature in classroom. They emphasized on the necessity of further researches and studies for proving successful effects of information technology educational programs on teachers, pupils, graduated and staff professional promotions in Hong Kong [9]. Also, in a study named "Investigating desirable pattern of teachers' computer literacy in Iran's guidance school" that conducted by Fathian and Noroozy in science and industry university. They tried to study the results of teachers' polling to suggest a suitable pattern for teaching information technology skills and teachers' computer literacy in guidance schools. Therefore, they first investigate computer literacy position in education and training ministry, especially teachers' computer literacy in guidance school and then results were presented that obtained from teachers' polling and field research about skills that they have learnt and skills that they should learn. Results showed that teachers are very weak in computer literacy and skills, so that education and training ministry should resolve teachers' weakness in this field [10]. Therefore, in this research it was tried to develop this technology between teachers and students by providing a suitable model of ICT literacy skills. Thus, it's evaluation to develop awareness and knowledge of teachers and students about information and communication technology by representing digital knowledge. So, the main goals of this research are as following:

- Determination and comparison of secondary school teachers and students' literacy for accessing information (collect and/or retrieving data).
- Determination and comparison of secondary school teachers and students' literacy for information manage (information application and classification).
- Determination and comparison of secondary school teachers and students' literacy for incorporating and integrating information (interpretation, information representation and summarization and information exchange).
- Determination and comparison of secondary schools teachers and students' literacy for evaluation of information (judgment about the quality, efficiency of information).
- Determination and comparison of secondary school teachers and students' literacy for producing information (designing, Innovating and creating information).

DEFINE AND THE MODEL OF ICT LITERACY

Discussions about information and communication technology literacy should be begun by information literacy concept. The term "information literacy" was coined in the 1970s by library and information professionals; librarians readily chose "information literacy" over "library literacy". With the emergence of information technologies in the 1980s, it became an acceptable education term. American libraries association defines ICT literacy as following: individual should recognize necessary information and have ability to evaluate information and using them [11]. Also, information literacy consists of many skills related to directing and seeking information and communication. So, ICT literacy is a part of specialization of information literacy that concentrates on information merit explanation via technology [12]. ICT literacy contains information like storage, regulation, publishing and other outstanding changes in recent years. So, we should define literacy with changes that contain recent knowledge and skills related to recent world. Therefore ICT literacy consists of the ability of using technology tools like: information and communication search and sorting and accessing to Digitalized context and using data [13]. Also, ICT literacy includes using digital technology, communicative tools and access to communicative and informative networks, information management, data incorporation and integration, data evaluation and creation for accessing

cognitive function in society. In this definition, five components of ICT literacy are categorized. In these five parts, a set of skills and knowledge is represented that has an increased cognitive complexity. These five components are as following:

- Data accessing: knowing how to collect and retrieve data.
 - Data manage: applying an existing organizational or classification scheme.
 - Data integration: interpreting and representing information. It involves summarizing, comparing and contrasting.
 - Data evaluation: making judgments about the quality, relevance, usefulness, or efficiency of information.
 - Data creation: data production by data invention, establishment and design in digital environment.
- Table 1 the model of ICT literacy shows in the 21st century.

RESEARCH METHOD

Statistic population, sample and sampling method: Data collection in this research is limited to factors that affects on secondary schools of Mazandaran, a province of Iran, that consist of teachers (male and female) and students (boy and girl) of grades 1, 2 and 3 of daily secondary schools in academic year of 2006-2007. Sampling was done in this research in two stages. The stage one was performed via randomized sampling and in stage two Kergsy and Morgan tables was used for selecting statistical sample. Teachers statistic sample contains 367 persons that 195 out of them were female (53.1) and 172 out of them were male (46.9). From 367 teachers, 8 persons (2.2) had diploma, 96 persons (26.2) were supreme diploma and 244 persons (66.5) were graduate degree. 11 persons (3%) were masters of Arts. 8 people (2.2) had no response. Also, 179 teachers (48.8) out of 367 had more than 15 years record of services. The least record of services was 5 years that 11 teachers had (3%). 38 teachers (10.4)

has 5 to 10 years record of services. 122 teachers (33.2) had 10-15 years record of services. 17 teachers (4.6) didn't show their record of services. from 367 teachers, 65 persons (17.8) were 20 to 30 years old and 204 person (55.5) were 30-40 years old and 98 teachers (26.7) were of higher than 40 years old. Students statistic sample were 390 that 218 persons were girls (55.9) and 172 persons (44.1) were boys. 28 students (7.2) out of 390 were in grade one. 33 students (8.5) were in grade 2 and 32; students (84.3) were in grade 3.

Research procedure and data measurement tools:

Questionnaire and interview were used in this research for data collection. A questionnaire was provided for data collection by different studies and then it was distributed between the samples of teachers and students. Then, each subject was asked to explain his/her answers to assure his/her answer correctness. So it had a kind of interview and then the questionnaires were collected and analyzed. The questionnaire had 3 parts. Part one was introduction on how to answer the questions. Part two related to personal information that consists of data of sex, academic, age and teachers' record of services and students grades and sex. Part three is related to questionnaire questions that have been regulated as two-option answer (Yes-No). Therefore, a self-constructed questionnaire was research a main tool for data measurement and collection that had 27 questions. Questions 1-6 related to aim 1 of research; questions 7-14 related to aim 2 of research and 15-19 related to aim 3 of research, questions 20-23 related to aim 4 of research and questions 24-27 related to aim 5 of research.

Pretest method was used for removing questionnaires' defects and ambiguities. Before questionnaires' final adjustment and replication, two ICT experts were asked to study questionnaire to comment on question fitness with research objectives. Their comments were collected and the questions were accepted by them were selected. Then the questionnaire was tested between 75 persons that were 10% of sample population of

Table 1: The model of ICT literacy

Skills	Explanation
Access	Collecting and/or retrieving information in digital environments
Manage	Using ICT tools to apply an existing organizational or classification scheme for information
Integrate	Interpreting and representing information, such as by using ICT tools to synthesize, summarize, compare and contrast information from multiple sources
Evaluate	Judging the degree to which information satisfies the needs of the task in ICT environments, including determining authority, bias and timeliness of materials
Create	Adapting, applying, designing or inventing information in ICT environments

teachers and students. Also, their comments on questionnaires were collected. Then in final stage after complete affirmation, it was executed on all subjects from research population.

For determining questionnaires' reliability by SPSS software, Cronbach Alpha was obtained for skill level measurement options. The result was very desirable. Cronbach Alpha was more than 75% for skill level measurement concepts that was acceptable and showed that these questions have measured more than 95% variance of related variable.

Data analysis: Descriptive statistics were used for data analysis that was the respondent's frequency and percentage distribution tables and two dimensional tables and then deductive statistics (Chi-square test) was used, because research variables were measured in nominal level measurement, Chi-square test is the most appropriate test for these data and 2×2 tables.

RESULTS

In this section, all research objectives in sample population and results and findings obtained from skill measurement in LCT literacy between teachers

and students are investigated for data analysis by using the indicators of descriptive and deductive statistics.

The comparison of teachers and student competencies based on the level of skill in data retrieval: Results obtained from the comparison of teachers and students' competencies based on the skill level of data retrieval have been presented in Table 2. Based on this table, 217 teachers (59.1), based on this table, had skill in data retrieval. But 150 teachers (40.9) were not skillful. Also, 303 students (77.7) were skillful in this field and 87 students (22.3) were not.

For difference evaluation of skill level between teachers and students in data retrieval, Chi-square meaningful test was used that its result is shown in Table 3. Based on this table, we can say that in freedom degree of 1 and confidence distance of 99.9, there is a meaningful difference between the skill level of teachers and students in data retrieval.

The comparison of teachers and students literacy based on skill level in data application and classification: Result obtained from the comparison of teachers and students' competencies based on the skill level of data application

Table 2: Two-dimensional table the comparison of teachers and student competencies based on the level of skill in data retrieval

			Occupation		
			Teacher	Students	Total
Data retrieval	How have skills	Count	217.0	303.0	520.0
		% within data retrieval	41.7%	58.3%	100.0%
		% within occupation	59.1%	77.7%	68.7%
		% of Total	28.7%	40.0%	68.7%
	How have not skills	Count	150.0	87.0	237.0
		% within data retrieval	63.3%	36.7%	100.0%
		% within occupation	40.9%	22.3%	31.3%
		% of Total	19.8%	11.5%	31.3%
Total		Count	367.0	390.0	757.0
		% within data retrieval	48.5%	51.5%	100.0%
		% within occupation	100.0%	100.0%	100.0%
		% of Total	48.5%	51.5%	100.0%

Table 3: Chi-square tests for meaningfulness of first goal

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson chi-square	30.299	1	0.000		
Continuity correction (a)	29.442	1	0.000		
Likelihood ratio	30.540	1	0.000		
Fisher's exact test				0.000	0.000
Linear-by-linear association	30.259	1	0.000		
N of valid cases	757.000				

A computed only for a 2x2 table

Table 4: Two-dimensional table the comparison of teachers and students literacy based on skill level in data application and classification

			Occupation		
			Teacher	Student	Total
Data application and classification	How have skill	Count	206.0	297.0	503.0
		Data application and classification % within	41.0%	59.0%	100.0%
		% within Occupation	56.1%	76.2%	66.4%
		% of Total	27.2%	39.2%	66.4%
	How have not skill	Count	161.0	93.0	254.0
		Data application and classification % within	63.4%	36.6%	100.0%
		% within Occupation	43.9%	23.8%	33.6%
		% of Total	21.3%	12.3%	33.6%
Total		Count	367.0	390.0	757.0
		Data application and classification % within	48.5%	51.5%	100.0%
		% within Occupation	100.0%	100.0%	100.0%
		% of Total	48.5%	51.5%	100.0%

Table 5: Chi-square tests fore meaningfulness of second goal

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson chi-square	34.001(b)	1	0.000		
Continuity correction(a)	33.108	1	0.000		
Likelihood ratio	34.284	1	0.000		
Linear-by-linear association	33.956	1	0.000		
N of valid cases	757.000				

A Computed only for a 2x2 table, B 0 cells (0.0%) have expected counts less than 5. The minimum expected count is 123.14

Table 6: Two-dimensional table the comparison of teachers and students' competencies based on the level of skill in data interpretation and representation

			Occupation		
			Teacher	Student	Total
Data interpretation and representation	How have skill	Count	143.0	245.0	388.0
		Data interpretation and representation %within	36.9%	63.1%	100.0%
		% within Occupation	39.0%	62.8%	51.3%
		% of Total	18.9%	32.4%	51.3%
	How have not skill	Count	224.0	145.0	369.0
		Data interpretation and representation % within	60.7%	39.3%	100.0%
		% within Occupation	61.0%	37.2%	48.7%
		% of Total	29.6%	19.2%	48.7%
Total		Count	367.0	390.0	757.0
		Data interpretation and representation % within	48.5%	51.5%	100.0%
		% within Occupation	100.0%	100.0%	100.0%
		% of Total	48.5%	51.5%	100.0%

Table 7: Chi-square test for meaningfulness of third goal of the research

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson chi-square	43.069(b)	1	0.000		
Continuity correction(a)	42.119	1	0.000		
Likelihood ratio	43.478	1	0.000		
Linear-by-linear association	43.012	1	0.000		
N of valid cases	757.000				

A Computed only for a 2x2 table, B 0 cells (.0%) have expected counts less than 5. The minimum expected count is 178.89

Table 8: Two-dimensional table the comparison of teachers and students competencies based on data quality and utility judgment

			Occupation		
			Teacher	Student	Total
Data quality and utility judgment	How have skill	Count	150.0	255.0	405.0
		Data quality and utility judgment% within	37.0%	63.0%	100.0%
		% within Occupation	40.9%	65.4%	53.5%
		% of Total	19.8%	33.7%	53.5%
	How have not skills	Count	217.0	135.0	352.0
		Data quality and utility judgment% within	61.6%	38.4%	100.0%
		% within Occupation	59.1%	34.6%	46.5%
		% of Total	28.7%	17.8%	46.5%
Total		Count	367.0	390.0	757.0
		Data quality and utility judgment% within	48.5%	51.5%	100.0%
		% within Occupation	100.0%	100.0%	100.0%
		% of Total	48.5%	51.5%	100.0%

Table 9: Chi-square test for meaningfulness of fourth goal

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson chi-square	45.668(b)	1	0.000		
Continuity correction(a)	44.688	1	0.000		
Likelihood ratio	46.116	1	0.000		
Linear-by-linear association	45.608	1	0.000		
N of valid cases	757.000				

A Computed only for a 2x2 table, B 0 cells (.0%) have expected counts less than 5. The minimum expected count is 170.65

and classification that have been shown in Table 4. Based on this table, 206 teachers (56.1) were skillful in data application and classification and 161 teachers (43.9) weren't skillful in this area. Also, 297 students (76.2) were skillful in this field and 93 persons (23.8) were not skillful in data application and classification.

For difference evaluation of skill level of teachers and students for data application and classification, Chi-square test was used that its result has been shown in Table 5. Based on this test, there is a meaningful difference between the skill level of teachers and students in confidence distance of 99.9. On the other hand, the skill level of teachers and students is different in this area.

The comparison of teachers and students' competencies based on the level of skill in data interpretation and representation: Result obtained from the comparison of teachers and students' competencies based on the skill levels of data interpretation and representation have been shown in Table 6. Based on this table, 143 teachers (39%) were skillful in data representation and interpretation and 224 teachers (61%) were not skillful in this area. Also, 245 students (62.8) were skillful in this field and 145 students (37.2) were not skillful in data interpretation and representation.

For difference evaluation of skill level between teachers and students for data interpretation and classification, Chi-square test was used. This test has shown that there is a meaningful difference between the skill level of teachers and students in confidence distance of 99.9 in data interpretation and representation that was shown in Table 7.

The comparison of teachers and students competencies based on data quality and utility judgment: Results obtained from the comparison of teachers and students' competencies based on the skill level of data utility and quality judgment have been presented in Table 8. Based on this table, 150 teachers (40.9) were skillful in data quality and utility judgment and 217 teachers (61.6) were not. Also, 255 students (65.4) were skillful in this field but 135 students (34.6) were not skilled in this area.

To evaluate the difference between teachers and students, the skill level in data quality and utility judgment Chi-square test was used that has shown there is a meaningful difference between teachers and students level of skill in data quality and utility judgment in confidence distance of 99.9 from statistic point of view. This test was shown in Table 9.

Table 10: Two-dimensional table of skill levels of teachers and students in designing and creation of information

			Occupation		
			Teacher	Student	Total
Data designing and	How have skill	Count	109.0	215.0	324.0
		Data designing and creation % within	33.6%	66.4%	100.0%
		% within Occupation	29.7%	55.1%	42.8%
		% of Total	14.4%	28.4%	42.8%
	How have not skill	Count	258.0	175.0	433.0
		Data designing and creation % within	59.6%	40.4%	100.0%
		% within Occupation	70.3%	44.9%	57.2%
		% of Total	34.1%	23.1%	57.2%
Total		Count	367.0	390.0	757.0
		Data designing and creation % within	48.5%	51.5%	100.0%
		% within Occupation	100.0%	100.0%	100.0%
		% of Total	48.5%	51.5%	100.0%

Table 11: Chi-square test for meaningfulness of fifth goal

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson chi-square	49.936(b)	1	0.000		
Continuity correction(a)	48.903	1	0.000		
Likelihood ratio	50.636	1	0.000		
Linear-by-linear association	49.870	1	0.000		
N of valid cases	757				

A Computed only for a 2x2 table, B 0 cells (.0%) have expected counts less than 5. The minimum expected count is 157.08

The comparison of teachers and student's competencies based on the skill level of data designing and creation:

Obtained results from the comparison of teachers and students' competencies based on the skill level of data designing and creation were shown in Table 10. Based on this table, 109 teachers (29.7) were skillful in data designing and creation. 258 teachers (70.3) were not. Also, 215 students (55.1) were skilled in this area and 175 students (44.9) were not skilled.

Chi-square test was used to evaluate the difference between teachers and students' level of skill in data designing and creation. This test shows that there is a meaningful difference between teachers and students' level of skill in data designing and creating in confidence distance of 99.9. This test was shown in Table 11.

DISCUSSION AND CONCLUSION

The present research attempted to evaluate and compare ICT literacy between teachers and students of secondary schools. Therefore, provide a suitable model of skills ICT literacy to develop these literacy skills in school. Correspondingly, five components were provided in this research to developed ICT literacy

between teachers and students. These five components were set and analyzed as the main aims of this research. The results of this research are as following.

Objective one: Out of 757 respondents, 520 persons (68.7) stated that they are skilled in data retrieval. This rate was 59.1 between teachers and 77.7 between students that shows students are more proficient than teachers. Chi-square test shows this difference meaningful in confidence distance of 99.9.

Objective two: Out of 757 respondents, 503 persons (66.4) were skilled in. data application and classification. This rate was 56.1 for teachers and 76.2 for students that show higher level of skill between students than teachers. Chi square test shows this meaningful difference.

Objective three: Out of 757 respondents, 388 persons (51.3) were skillful in data interpretation and representation. This scale was 39% between teachers and 62.8 between students. That shows the higher level of skill of student than teachers that chi- square test shows this meaningful difference.

Objective four: out of 757 respondents 405 persons (53.5) were skilled in data quality and utility judgment. This rate is 40.9 for teachers and 65.4 for students, that shows the higher level of skill in students than teachers and Chi-square test shows this meaningful difference.

Objective five: out of 757 respondents, 324 persons (42.8) were skilled in data designing and creation. This rate was 29.7 for teachers and (55.1) for students, that shows the higher level of skill for students than teachers. Chi-square test shows the meaningful difference between the skill level of teachers and students.

The main result of this research shows the students' ICT literacy is higher than teachers'. So that the research findings show, students' ICT literacy is higher than teachers. The teacher that is responsible for teaching and learning process and transferring knowledge to student lacking ICT literacy and skill as a main key of learning skill in the 21st century. As we said, based on this research results, teachers have lower level of skill in ICT that shows the weakness of educational system in Iran. So, it is suggested that the schools try developing ICT literacy between teachers. Thus, education officials should try to provide suitable approaches for promoting teachers ICT literacy to develop teaching-learning process in schools especially between teachers and students. As we erstwhile said, Yangen and Coworkers concluded in their studies that teachers have lower level of ICT skill. They suggested that teachers should be familiar with this technology to be successful in learning-teaching process [9]. The results of this research indicate this fact. Also, in a research conducted by Fathian and Noroozy [10] results showed that teachers are weak in computer literacy and skills. They suggested that educational organization should try to remove this weakness [10]. In the study, Tang and Ang [14] the effect of communication in ICT literacy integration were studied. They suggested that teachers should not be considered as teaching receivers but they should be considered as participants in teaching and learning [14]. Hence, in another study, Larose *et al.* [15] argue that regardless of the quality of ICT equipment available to teachers and students in the school environment and independently of the quantities of courses which they have taken during their undergraduate studies, the level of transfer of acquired competencies and learning to practice is very weak. However, the major impact of education on the educated remains at the level of the "private" use of these technologies and not in their integration into daily

teaching practices. Larose and colleagues further pointed out that many of the educated, no matter the level of education, have minimal computer literacy but do not use it in their pedagogy because of the fear that the rapidity of obsolescence of the hardware and of the software will make their task more complex and interminable [15]. Hakimy [16] concluded in a study named "the study of effective factors in using ICT" that teachers were not prepared for teaching by using ICT technology. Teachers' necessary needs and services were limited and teachers were not prepared for using computers and their software's and hardware's. Additionally, teachers' responses to questionnaire and analyzing their data showed that using software's and hardware's is a big problem for teachers [14]. This research shows the teachers weakness in ICT literacy skill. In a research conducted by Rakes and Dowson [17] it was shown that if teachers have higher education in ICT literacy, they promote students and school in this area (ICT). They suggested that without good and educated teachers with capability in ICT literacy skill, it is impossible to execute ICT programs in schools and integrating them with students' curricula. Therefore, shouldn't hope to see student development in ICT skills [18]. Teachers report in this study that they have weakness in ICT literacy and limited effect on this level of ICT literacy skill and they can not use ICT skill in their curricula.

Another finding of this study is the meaningful difference between the skill level of teachers and students in all five components of this research. For justify these findings we can say that all these five components are useful for helping teachers and students in teaching-learning process. Considering these finding we say that the knowledge of these five component, data retrieval, data application and classification, data representation and interpretation, Data evaluation, data designing and creation and their correct application in educational system are effective in developing teachers and students teaching-learning process and promote ICT in schools. These components are the main educational tools in teaching-learning process in the 21st century. Therefore, present research attempts to help teachers and students' to be proficient in ICT literacy and prepares them to create a desirable teaching-learning process and promotes them in schools. Also, some suggestions were presented about ICT literacy skills with respect to research results that were suitable approaches for developing ICT literacy. These suggestions are as following:

- It is suggested to develop ICT literacy conception like general literacy in society especially in educational environments.
- The officials of educational organization should support educational experts and researchers that execute new political and social researches in ICT literacy. Data obtained from these researches help politicians, educators and craftsmen to prepare a comprehensive program.
- The officials of educational organization should prepare programs for teachers and students to use ICT in curricula and different scientific activities. Teachers' and students' activities should be evaluated.
- It is suggested to consider national and global researches and ICT educational researches that were executed in different levels in educational organizations.
- It is suggested to compile national and global standards for developing ICT literacy in different levels especially between teachers and students.
- It was suggested to prepare a condition for all education organization members specially teachers and students to access computer and internet and use technology resources like LCT specialists and other scientific and data tools by low cost. Also, by accessing computer software and hardware and internet, learning and teaching to be developed in future in this organization.
- The officials of educational organization should evaluate ICT literacy based on global scales and evaluate international ICT literacy of teachers and students.
- Information and communication technology application and integration in teachers' curricula.

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