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Information and communication strategies for increasing information literacy in students

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Abstract

The study reviews the effects of Information and Communication Technology (ICT) on learning and information literacy of students. Experimental method involving experimental and control groups was used. Pre-test and post-test were run to investigate the effectiveness of ICT. The statistical population of the research consisted of all male third year students of middle school (school year 89-90) in the city of Arak. After pre-certification testing and applying random cluster sampling, 64 students were selected and placed into two experimental and control groups. Data collection instruments were Educational Improvement Test and Standardized Information Literacy Questionnaire. Collected data were analysed using analysis of covariance method, t-test, and non-parametric Mann-Whitney U test. Findings showed that general hypotheses of the research were true: ICT has a significant effect on learning rate of students, and there is a significant difference between the experimental group and control group regarding information literacy and its features. Based on the results of this study, we recommend educational authorities to apply ICT in educational canter in order to improve students' learning and educational quality.

Keywords: Information and Communication Technology (ICT), learning, information literacy, students

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1. Introduction

Entrance of ICT to areas of men's activity and its extension in current century, particularly in schools, has become the most effective instrument for experts and educational administrators for improving learning and teaching methods that promote educational goals. Current age is the information age, the age that requires having information and making relation to obtain required information. ICT has changed social structure, life style, communicational process, and even educational manner and leads to the phenomenon called information society and the age called the age of knowledge. Many researchers view information society as multi-structure and multi-dimensional society in which all layers and levels require information.

Learning is one of the most important areas in today's psychology and one of the most difficult concepts for definition. The much known definition of learning is "the process of making relative stable change in behaviour or behavioural potentiality that is the result of experience which can't contribute to temporal state of body, such as states that are the results of illness, fatigue or using drugs". This displays that learning is the activities that are performed by learner and the role of teachers is just providing facilities and conditions that facilitate learning.

Educational technologies provide fields of creating and enjoying these situations in order to obtain the required information. ICT is collecting, organizing, storing, publishing and using information in graphic, text, number and etc. through telegraphs and computers.

Undoubtedly, using ICTs is very effective in educational context. Applying ICT in education makes educational context metaphorical, allows extension of learning opportunities and having access to educational resources, and accelerates and facilitates the training process. In an educational definition about ICT, one can say that information and communication technology is planning and facilitating the use of computers, software, the Internet, and communicational devices that include teaching, learning and other educational activities with different methods. Daniel, assistant of UNESCO manager in training and education field, said that information technology is one of the basic elements of modern society.

Nowadays, in many countries, along with reading, writing, calculating, understanding ICT and having basic skill in the field of information technology, have paid attention to it as a part of central core of training and education. Now, many countries placed developing IT concepts and basic skill as a part of education and learning as well as reading, writing and calculating.

After drastic changes in the field of ICT, concept of traditional literacy has experienced changes. One can mention political literacy, social literacy, cultural literacy, media literacy, information literacy, etc. Information literacy defines access ability and using information of every form or model such as print or electronic. Longford considers information literacy essential to applying information, communication and efficient link to media and information technology. According to information, a literate person is a person who has recognition knowledge and ability, who is capable of recovering and assessing information. Literacy is the base of individuals' information, capacity and potentiality of acquiring knowledge and substructure of their living affairs.

New technologies that support training and education bring about meaningful learning and can contribute to the changes of traditional method and teacher-centred to learner-centred teaching and learning.

Enjoyment of information and communication technology with weighted planning is performable in all lessons, particularly at different educational stages. One of lessons that can be taught through this method is experimental science. Teachers can recognize communication and capacity of information technology and use them for creating meaningful learning in classroom and change in information of students.

Since, junction point of usage of advanced tools was summarized in education and having information in a phenomenon named as producing knowledge, it is necessary that students and learners in all educational stages obtain skill in both fields to be able to move in the way of production and promotion of knowledge independently. Regarding the importance and necessity of the students' problems, by considering the effects of applying information and communication technology on the rate of learning and information literacy of male students in third year at middle school in experimental science, the current study emphasizes the importance of empowering students in using new technologies and its effect on learning and information literacy in this field.

2. Method

This research is an experimental study with pre-test and post-test model in which the effect of using ICT on learning rate and information literacy of male third year students in experimental science have been studied. Statistic society in this research include all male third year students of a middle school of Arak city in educational year of 89-90 (N=1450). Using random cluster sampling, 64 students were selected and placed into two groups of experimental and after pre-certification testing.

Hypothesis:

1. ICT has a positive effect on learning rate of male students in third year of middle school in experimental science.
2. ICT has a positive effect on students' information literacy in experimental science.
3. ICT has a positive effect on development of students' skill of determining and recognition of information.
4. Communication and information technology has a positive effect on students' location skills and access to required information in experimental science.

Scales:

To collect information, educational achievement test in experimental science and information literacy questionnaire were used .Test of Educational progresses of experimental science is a test that researcher prepared. It includes 30 questions that have been provided with regard to content of experimental science in third year of middle school.

Justifiability of this test was supported by some researchers, teachers, and perpetuity of this test was calculated by Cronbach's Alpha as %80

Information literacy questionnaire has been prepared based on four skills of information literacy.

- 1) These four skills include: determining and recognition of needed information
- 2) Location and access to required information
- 3) Critical evaluation of information and integration of it to the basic knowledge.
- 4) Effective use of information in information literacy questionnaire

Performance method:

In this study, two classes were selected as an experiment group and control group from EDALAT middle school in ARAK city. In the next stage, the questionnaire and educational achievement test have been provided to the students of two groups before performing experimental work. During a session, method of using computer and educational software were taught to the students of experiment group, and in the next stage, using didactic tools of communication and information technology (software and multimedia) were applied to experiment group as an independent variable to test effect of these technologies on students. Communication and information technologies were taught to students of experiment group during 11sessions (2 hours per week) for 1.5months. During this time, students followed typical usual program and traditional methods of school. After completion of experimental work, as a post-test, informational literacy questionnaire and educational achievement test were distributed to students of two groups again.

Two classes were randomly selected as experimental and control groups from Edalat middle school in Arak. In the next stage, before performing independent variable and before performing experimental work, questionnaire and educational achievement test have been provided to students in the two groups.

They have been taught how to use a computer in a session and use educational software in the next stage with the help of didactic tools of communication and information technologies (software and multimedia). Using this technology, students were instructed during 11 sessions (2 hours per week) for 7.5 months. During this time, control group students continued using typical program and traditional methods. After completion of experimental work, information literacy questionnaire and educational achievement test as post-test have been provided to both groups again.

3. Analysis

SPSS 18 software was used for analyzing data. Covariance analysis test, t-test, and effect rate of independent groups have been used for statistical analysis of data and for comparative surveying of two. T-test is used to sample average comparison with a constant number (one group) and the comparison of the average of two groups .Covariance analysis is a suitable tool to control elementary differences among groups .Role of covariance analysis is to equalize compared groups on the basis of one or more controller variable. Because information literacy questionnaire has been made using Likert-scale and this scale is a ranking one, Whitney u-man non-parametric statistic has been used for analysis of information literacy. Whitney u-man test is used when researcher wants to determine whether there is a significant difference between dispersal of two and independent sample. If calculated U value is meaningful, we conclude that scores trend in center of a society will be more than other societies.

For statistic analysis of data and for comparative examination of the two groups of students' average score, covariance analysis test and t-test and effect rate for independent group have been used. T-test is run for sample average comparison. It's a constant (one group) and comparison of average of two groups.

ANCOVA is a suitable tool for controlling elementary differences among groups. Since information literacy questionnaire has been made using Likert-scale and this scale is a ranking scale, non-parametric U-man. Whitney U test has been used for statistic analysis of information literacy.

Mann-Whitney u test can be used if researcher can determine whether there is a meaningful difference among dispersal of two independent samples. When calculated U value is statistically meaningful, it is concluded that score trend in one centre of a society is more than in other society.

Table 1

Groups	Pre-Test	Post-Test	Pre-Test Mean	Post-Test Mean
Control Group	32	32	11,50	11.01
Experimental Group	32	32	11,87	93.59

Summary results of educational progress with pre-test and post-test

Test of first study theory.

Using information and communication technology has positive effect on learning rate of male students in middle school.

In order to measure students' learning rate in experimental and control group, educational progress test has been used. Table 2 shows average, standard deviance for scores of students' post-test in learning rate of two groups.

Table 2

Statistic parameter of changes resources	Square sum	Freedom grade	Square mean	F	Unilateral meaning level
Pre-test	0,427	1	0,427	0,05	0,814
information and communication technology	295,69	1	295,629	38,62	0,000
Lapse variance	467,01	61	7,656		
sum	641341	64			

The test of second study theory:

For considering information literacy of students, Likert ranking scale was used. Regarding this scale, measuring data in ranking level have been collected. Score of students was not cumulative, so to analyse the data, Mann-Whitney u non parametric test was run to display the scores of students of two groups in information literacy.

statistic	z	Mann-Whitney u	Meaningful-level
information literacy post-test	6,63	18	0,000

Summary results of Mann-Whitney u analysis for post-test of student's information literacy

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As shown in Table 3, Mann-Whitney u value among the two groups is 18, and since this value is less than %5 the second study based on effect of information and communication technology on student information literacy has been supported.

The test of third study theory:

Information and communication technology has a positive effect on the skill of determining and recognition of information need of male third year students.

Analysis	z	Mann-Whitney u	Meaningful-level
determining and recognition of information need	4,520	225	0,000

Results related to component of determining and recognition of student information need

As Table 4 displays, Mann-Whitney u value is 225 and nication technology has a positive effect on determining and recognisingof information need.

The test of fourth study theory

Information and communication technology has a positive effect on skill of location and access to required information of male students in middle school.

Analysis	z	Mann-Whitney u	Meaningful-level
Component location and access to information	-3,381	288	0,001

Data result related to component of location and access to students information

As Table 5 displays, Mann-Whitney u value is 225, and meaningful value is 0,001, and since this is less than 0,05, so the findings suggested that information and communication technology has a positive effect on skill of location and access to required information of male students in middle school.

Discussion and conclusion

Considering the first theory, we suggest that ICT has increased learning rate of male students in experimental science. This is consistent with the results of previous studies. Based on the second theory, we can conclude that using ICT has increased information literacy of male students in experimental science. Results of this study are consistent with the previous studies. The study suggested that information and communication technology has a positive effect on skill of determining and recognition information literacy of male students in experimental science.

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In addition, using information and communication technology has a positive effect on skill of location and access to required information of male students in experimental science. Based on obtained results, it is proposed to create and extended computer workshop in all schools and to consider special planning related to information and communication for students at different stages.

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