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To Study Effectiveness of Application ff Information and Communication Technology (ICT) In the Quality of Learning Pre-University Biology Lesson

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Abstract
The aim of present research is to study efficiency and effectiveness of application of Information & Communication Technology (ICT) in the quality of learning biology by pre-university students. Done in the city of Eslamabad-e Gharb in 2011, this is a semi-experimental research.
Statistical population included all 595 pre-university students. Study sample was modified into 50 persons by using randomized sampling method. Initially, the group was tested by 2 repeat test stages , the 1sf one was taken place 15 days after initial performance and the 2nd one 30 days after that. In order to apply ICT to teaching process, 10 5-people classes equipped with computers were provided for each 5 of who has connected to each other as well as to respective teacher via network. Classes were controlled by using Net-matter of biology were delivered by using 3 methods of electronic subject-matter, which was prepared in advance by respective teacher and with Power Point software based on Ganiehs design model, of Internet applications, and of educational software usage , Raw data obtained was analyzed by SPSS software and t-test performed on 2 independent groups was the statistical technique used , which confirmed the results relating effectiveness of application of ICT in deep, effective, extensive , and sustainable learning .
Kegwords: Information and Communication Technology (ICT), Learning quality , Biology.

I. Introduction

To use Information and Communication Technology (ICT) in the field of learning has resulted in a novel environment called electronic learning (e-learning). In this method, lesson subject-matters are prepared in the framework of one of educational models by using attractive text, audio-visual, and graphic elements. This is a good manner to learn theoretical lessons, especially those learning of which needs to repeat topics. Experiences of those countries that have changed their systems for many years indicate that biology is the best starting point to create quality of general education in high-school natural sciences. Unfortunately, our textbooks very rarely ask students to use ICT in order to do their homework [1-3]. One of these learning alternatives is based on computers and on using multimedia software. Teachers play a major role to introduce into and integrate computers with school system successfully and provide desirable learning situations [4-7]. Recently, much experimental evidence has shown that multimedia delivery in education can be more effective in teaching-learning process as an educational mediator based on the cognitive theory supporting it and on guided educational planning. In 1998, Science Academy did a research on effectiveness of computer application in effective learning, the results of which showed that those learners who were aided in learning process by computers were more successful than those were not. During doing a research, Chang (2003) observed that those Thai students receiving web-based education possessed high statistical. Ultimate aim of using ICT is t increase teaching effectiveness and to improve learners learning [-5-9]. Nowadays, computer applications are of a unique place in teaching biology. Given the role and importance of animation to learning it is possible to apply animation to power point program in order to comprehend subject-matter better.

For example, learning subjects like water cycle, cell growth, the way of seeing, the way of heaving, digestive tract work, blood circulation work, etc. becomes easier [9]. An ICT-based teaching method helps teachers and students are active in taking a learner-centered method [10-13]. Due to having a flexible schedule, ICT-based education enables learners to study course subject-matters via computer networks a tan time and any place [14]. Due to having a flexible schedule, ICT-based education enables learners to study course subject-matters via computer networks at any time and any place. Usage of multimedia tools was investigated in a research done by Stew et al.

They believed that web-based teaching methods need to emphasize on problem-centered issues

and provide students with different forms of interaction opportunities. In view points of Holmes and Benhaan, e-learning is a category of learning taking place in network environment being served by a set of multimedia and telecommunication technologies. Internet is the basic pivot of transition brought about by e-learning. Electronic learning takes place via electronic tools and by taking advantage of network communication. This approach uses informational elements with different formats such as text, video, voice, animation, graphics, and virtual or simulated environments to deliver subject-matters. Computers provide learners and teachers with feedback not only during learning process, but also immediately from learning outcomes.

Depending on how students act, teachers can find out whether educational materials work correctly or not, then, they make necessary corrections for them on the basis of results obtained. With respect to information retrieval technology, Zavaari and Majid did a research titled "informational needs and behavior of information searchers" on Malaysian biomedicine scientists. Results indicated that the biggest problem with informational tools among new technologies is having no knowledge of how to use such facilities. Titled "effects of computer-aided teaching on end-year students performance in biology in comparison with traditional methods, a research was done by Disso et al. semi-experimentally in Ghana. Analysis of statistics showed that performance of test group, the group which learned concept of natural sciences via computers, was on average better than that of control group which learned concepts traditionally.

Finding of a research title "school multimedia approach to effects of web-based teaching" suggested that performance of test group was above average and better than that of control group. A meta-analytical report titled" comparison of effects of electronic teaching (e-teaching) with traditional method" was provided by Justchik (2010) from U.S. Education Ministry. The results indicated that e-teaching alone is more effective than combined one (electronic teaching plus face-to-face teaching). During a research titled "effectiveness of ICT-based education at different levels and lessons", Bower et al.(2008) stressed that techniques for applying ICT to education are widely diverse. Eslamis study indicates that new technologies can bring attractive programmers based on existing facts into classrooms and strengthen learning by providing teaching aids. Other researches done by Miyer (2002) suggested that combining video clips designed. Najafi and Mohammadi (2006) did a research titled "effects of Information Technology(IT) on Ardebil high-school students scholastic progress."

Findings of that research indicated that in terms of students (male and female) scholastic progress, application of computers and IT was different from that of common educational methods. During a research titled "to study effectiveness of multimedia construction by students in their learning of grade-5 natural sciences lesson, Karami and Attaaraan (2006) examined effects of application of ICT-aided sciences teaching method, namely , multimedia construction by students. Results of that research demonstrated that compared to students taught traditionally, students who were taught sciences lesson by method of multimedia construction in classroom had better and deeper learning. Taaheri (2007) studied effects of application of computer simulation programmers of chemistry on learning of subjects in 3 cognitive, psychomotor, and emotional domains. Findings of his research showed that application of computer simulation programmers to chemistry lesson increases student's cognitive learning, lab skills, and interest in chemistry. During their research titled "exploitation of high-school 3rd-grade physics teaching-aid software and examination of its effects on students scholastic and interactional progress in classroom between traditional teaching and teaching by computers. Results of the research showed that exploitation of computers had a significant effects on increasing students learning, increasing their interaction with each other, and strengthening their spirit for doing group work. During their research titled "effectiveness of ICT-based education at different levels and lessons". Bower teal (2009) examined advantages of teaching mathematics electronically. Results of their research indicated that performance of test group students (trained in computer lab) was evidently better than that of control group (trained traditionally). Another research titled " prediction of students success with ICT teaching method combined with various learning styles" was done in Turkey by Deryakulu et al, (2010).

General objective of present research is to study effectiveness of application of ICT in quality of learning pre-university biology lesson. Two hypotheses are outlined in this research,

H1: There is a significant difference between learning quality in traditional method and ICT-based one,

H2: Application of ICT has as effect on pre-university learners learning quality.

As a semi-experimental research, was done on pre-university school in Eslamabad-e Gharb city. Statistical population consisted of whole pre-university students of the year of 2011,the number of whom was 395,50 of whom were assigned to 2 25-people groups by using randomized method and even-odd numbers.

II. Teaching method

Pre-university biology textbook includes 3 parts : the first containing 2 chapters, the second 7 chapters, and the third 11 chapters, but chapters on

protein-producing and technology in part 1 were chosen and each was taught during 4 90-min sessions because present research was during the first 3 months of school year of 2011-12. For test group, teaching method was based on ICT, initially, students were divided in to 2-people groups, each of which had a computer and all computers were connected to each other in the form of a network, being at teachers hands.

Computer-checking net Support school software was installed to control users and manage the class. Subject-matters were delivered to students by 3 methods: one by using some multimedia software, which was able to hold unlimited test accompanied by scheduling, and providing grade sheet and detailed answers. This software was also capable saving information and strengths of users. The second's method was to prepare electronic content by respective teacher, which was prepared with flashcard, photoshop, video studio, and movie-maker software and delivered to students in the form of PowerPoint programmed. The third method for using Internet was programmed by learners gathering data and participating in group question and answer. Learners searched Internet for answers to advanced questions, saving them for their group questions and participating in online tests. Each group had a collective weblog being managed by group members and being used to do homework and to offer materials. Finally, answers were sent to teachers e-mail and answers to group homework were sent privately to teachers weblog in order for other group not to have access to their responses, them, they could visit its feedback on their own weblog prior to the second session. Assessment was performed through 3 steps of entrance test, formative assessment, and final assessment. Some times this task was done online and other times test-containing educational software was employed and results were given back to students at the same session. Soft Test software was used to design tests. Submission of homework took place individually and collectively. Students were asked to save results on Excell, word, Powepoint and /or any desirable medium; otherwise, it was introduced to electronic box .At the end of educational course, researcher-made test (containing 40 items from chapters 1 and 2) was performed on control and test group. In order to study effects of ICT-based teaching method on students sustainable learning end-course test was administered, with no prior inform, initially, 15 days and next, 30 days after initial administrating.

Data

Data-collection instrument was a researcher-made test containing 40 items from chapters 1 and 2 of pre-university biology textbook (2010 edition).

For this test, any students were given grade 1 for each correct answer, the sum of which was considered total grade for the test (totally grade 40). Items of this test were divided into 1 objective and detailed groups. Objective items were designed in 3 categories of true / false (item 1-8), fill in the blanks (items 9-16), and 4-optional (items 7-24). And detailed items were designed in 2 categories of close-ended (items 25-32) and open-ended (items 33-40). This research employed 2 test and control groups and independent variable (ICT-based teaching method) was performed on test group. The 1st test was performed on both groups immediately after teaching was finished and the 2nd one was administered 15 days after teaching with no prior inform and the 3rd one was administered 30 days after teaching with no prior again.

III. Statistical analysis

After gathering data, SPSS software programmed was used to perform statistical analysis. Independent t-test was employed in order to compare means of the grades of 3 tests for 2 test and control groups. Two independent groups t-test was used to compare means of grades of test 1 with test 2. 2 with 3, and 1 with 3 in order to determine the level of sustainable learning in 2 test and control groups.

Based on data definition, more than a 60% difference between means of grades of re-tests and the 1st test indicates sustainable learning in that group.

Findings

Analyzing data statistically indicated that means of grades got by test and control groups students in the 1st test were higher compared to those of the 2nd and 3rd ones.

Means of grades got by test group were 33.28, 29.60, and 28.36 for test 1,2, and 3, respectively. These figures were 31.80, 25.24, and 20.96 for test 1, 2, and , respectively, for control group. To test H1 of research, independent t-test was used, the results of which are given in table 1 for separate tests and sample groups.

Table 1. Independent t-test for each of test between 2 test and control groups.

Test	Freedom Degree	T-test	Significance level
Test 1	48	1.027	310%
Test 2	48	1.751	86%
Test 3	48	3.488	01%

Considering the results contained in table 1 and calculated t, it is concluded that there is no significant difference between test and control groups for tests 1 and 2. But given t=3.488 calculated at significance level of .001% , it is know that biology ICT-based teaching method influences quality of pre-university learners learning in the 3rd post-test, but such influence was not observed in the 1st and post-tests.

Two independent groups t-test was used to test H2 and to study effects of ICT-based teaching method on quality of learning pre-university biology as well as t compared mean grades of test 1 with2, 2with 3, and 1 with 3 for test group. Results of these calculations are seen in tables 2-4.

Table 2.
Two independent group's t-test for difference between means of 1st and 2nd tests for test group.

Test Difference	Mean Difference	Standard Error	Standard Deviation	Freedom Degree	t-test	Signidicance Level
1st and 2nd tests	3.68000	0.40299	2.01494	24	9.132	0.1000

As shown in table 3, t was calculated as 9.132 at significance level of p=0.00%, indicating that there was a significant difference between performance of test group in 2 situations of the 1st and 2nd post-test.

Table 3.
T-test of 2 independent groups for difference of means of tests 1 and 2 on test group.

Test Difference	Mean Difference	Standard Error	Standard Deviation	Freedom Degree	t-test	Signidicance Level
Tests 1 and 2	3.68000	.04299%	2.01494	24	9.132	.00%

Table 4.
T-test of independent group for difference of means of test 2 and 3 on test group.

Test Difference	Mean Difference	Standard Error	Standard Deviation	Freedom Degree	t-test	Signidicance Level
Tests 2 and 3	1.24000	.21817%	1.09087	24	5.684	.00%

Also, given table 4 and t calculated (t=5.684) at significance level of p=.00% , it is concluded that there is a significant difference between performance of test group in 2 situations of the 2nd and 3rd post-test.

Table 5.
T-test of independent group for difference of means of tests 1 and 3 on test group.

Test Difference	Mean Difference	Standard Error	Standard Deviation	Freedom Degree	t-test	Signidicance Level
Tests 1 and 3	4.92000	.55962%	3.95712	24	14.081	.00%

With table 5 and t=14.081 calculated at significance level of p=.00%, it is concluded that there is significant difference of the 1st and 3rd post-test.

IV. Discussion and conclusion

Results from independent t related to 3 tests performed between test and control group show that there is no significant difference between these 2 groups on the 1st and 2nd post-tests, but for the 3rd post-test, there is a significant difference between test and control groups. Therefore, it is concluded that biology ICT-based teaching method has an effect on the quality of pre-university students learning only on the 3rd post-test, but such effect was not observed on the 1st and 2nd post-tests.

Results of present research support this matter that students who were taught by an ICT-based teaching method outperformed those who were taught traditionally, the former got higher grades on end-course test and re-tests than the latter. This reflects more desirable effects of ICT-based teaching method on degree and recollection of materials learned or, in other

words, it reflects high quality learning. Test and control groups recollected 88.94% and 82.51% of subject-matters on the 1st post-test, respectively. For the 2nd post-test, these figures were 82.51% and 65.91% for both group and control one, respectively. Since percentage of subject-matters recollection is more than 60% for both groups. It can be concluded that both methods result in learning at desirable levels, but because this percentage is higher for test group, they forget less amount of learned materials so ICT-based teaching method can create more sustainable learning than traditional one can.

Studying present research compared to past studies suggests that application of ICT to teaching results in important of learning process. For example, researches done by Karami and Attaaraan(2006), Shobeyri and Attaaraan (2007), Taaheri(2007), and among foreign researches, those done by Minz and Olssen (1995), Sater (2002), Jaschick (2010) , Osseo(2010), Deryalulu et al., (2010), and Barrow (2009) all support this fact that application of ICT to teaching results in improvement of students performance and in an increase in their learning quality.

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