2nd Cyprus International Conference on Educational Research, (CY-ICER 2013)

Potential issues and impacts of ICT applications through learning process in higher education

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Abstract

Education is the great investment for the future. When investing in education, predicting future parameters and moving according to predictions is an essential part in the education process. In such an important subject, the use of technology cannot be avoided at all. By the birth of ICT-based education, a lot of innovation and change have occurred in education. ICT-based educations serve the purpose of both attended and non-attended (distance) education types. In summary, it helps people to access educational classes regardless of geographical distance or obstacles. The aim of this research is to determine and find out the perceptions of students, motivations and their success rate those study with Information and Communication Technology Based technology supported environments and universities and evaluate these outcomes to find out potential issues of ICT applications through learning process in higher education institutes.

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Selection and/or peer-review under responsibility of Prof. Dr. Huseyin Uzunboylu, Near East University, Faculty of Education, Cyprus

Keywords: Information Communication Technology, ICT-based education, student perception, higher education institutes;

1. Introduction

Technology, on behalf of education is not the purpose of education but assistant. Education associations run into students who are master at pc, video cd, mobile phone, and satellite devices in daily times. Teachers might face various difficulties of transferring contents in education programs by traditional ways or tools in case of not improving their technology usage skills (Aksoy, 2003).

Technology usage, which is one of the most effective elements of data-age, encumbers individual to strengthen citizens and occupation members in front of events and concepts and simplify the life. In order to survive in the society and become more compatible against technological developments, it is compulsory to understand the

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role of technology and in the society. This can be realized through the education. The education replaces the ignorance and causes the realization of responsibilities of human. The most important issue is to use and combine both the technology and education together and gather the most impressive side of it. In this specific study, The American University is used to implement a specific survey to gather information about student’s perceptions and behaviours through specific observation techniques. Student’s achievements at the end of the academic terms and examination results are also included into performance measurement variables. The implementation of Information Communication Technology (ICT) is one of the most important factors of performance achievements. This study will also be a simple guide for those instructors who use ICT in higher education institutes to implement ICT properly and realize the failure resources.

1.1. Problems in Technology usage in Education

The technology and education is combined together in the literature and used for measuring student perception, instructors perception or performance evaluation. The literature studies conducted on this field combined both the technology and education together and defined this concept specifically. The both filed of education technology and its impact on students performance. Each and every researcher defined educational technology similarly. The researcher, at the point that technology and education intersected; the science of “Education Technology” is revealed (İşman, Eskicumalı, 1999). According to a belief, educational technology is a discipline that is developed with practiced scientific researches, that coordinates the affectivity of teaching tools at human technology interaction for more effective teaching, take environmental factors under control, and theory and the application is combined. Another belief is that the, educational technology is a systematic approach with purpose of planning, realizing and evaluating teaching-learning method in best way (Alkan, 1984:13-15). As regarded from both approach the main purpose of educational technology is the total of planning, applications and evaluating with tools to have teaching-learning progress to gain activity. In any case, it is not sufficient to provide the particular tools to instructor without informing the usage of these tools. The information, which is supplied to use the particular educational technology, will make the instructor to concentrate on the particular course more effectively. By benefiting from all these descriptions, Educational technology is the total of systems that designs, realize and evaluate the learning-teaching progress, enables to use human power in suitable material and spiritual areas in best way, also enables to increases quality so that productivity and have learning effective.

1.2. Education Technology Groups

In learning-teaching environment, the educational technology groups can be divided into 2 different categories. These are:

i. Modern education Technologies (Electric-electronic systemized)

ii. Straight Formed Educational Technologies

In places where modern education technologies applied, student groups have powerful sides, limit backwards and increase educational benefits. In this category, learning-teaching environments contain specific tools (educational technology) to instruct/learn course materials easily. TV, radio, voice tape, telephone, video, slide machine, filmstrip projectors, computers, and CD multimedia are some of the instruments of modern education technologies. Those places where physical existence of students is not realized, the Internet and Internet based teleconferences are used widely for teaching/learning proposes by instructors and students (İşman, Eskicumalı, 1999:171).
Classic and straight-formed education technologies depend mainly on the physical presence of students in one place (class or campus), and depend heavily on the use of pen-and-board. No computer tools or electronic stuff are used in this type of teaching. A student has to take hand outs or notes during the class sessions or prepare themselves from the books, which provided by the course instructor. However, the course tutors use different techniques to make course materials more comprehensible. The use of graphics helps students to understand more complicated data easily (Rıza, 1997: s: 172). On the other hand, it can be more permanent to transfer thoughts visually while giving thought and its concepts by use of signboards. Modern education technology groups have chance to use different technological instruments during the class sessions. In contrast, classic and straight-formed education technology classes have multi-media or interactive class sessions.

1.3. Conceptual Framework

As it is mentioned before, educational technology groups fall into 2 categories, which are Modern education technology groups and Classic Straight Formed education technology groups. In this study, specific methods of each of these educational technology groups applied among student groups and results are inspected. At the usage of technology in education, it should not be considered whether communication and data processing technology products should be used or not, but how to use, how to supply, how to distribute, how usage and ethic principals will be, how their effects will be investigated and on which sizes they will be evaluated; how they can be benefited from educational purposes and principals. It is also known that level of usage of data technology in education for teachers is not sufficient. And since some of the students are loaded with information, which is related with these products as a result of, their environment requires opening a new dimension for relation between student-teacher-manager and even parent.

As a result, it is stated that each investment to technology requires investment for people too and that we are at the beginning of a long way for the usage of technology in education system. We can top it off with this sentence: loading schools with technology does not only solve Solution to technology in education. It can be said that the first thing that needs to be done before equipping schools with technological products is to educate teachers about technology usage and as an opportunity that will support learning and teaching progress and riches them.

2. Methodology

This research is descriptive research in a screening model and aiming to define and determine the impact of ICT based education programs on students those study in private universities which belong to Higher Education Council of Turkey and Education Ministry of Turkish Republic of Northern Cyprus. The descriptive research is used in this research and the maturity of the characteristics of this research requires getting into details into the past or present event and explaining the situation, differences and changes according to the present day.

2.1. Sampling Design

The population of this study consists of students from American University of the Kyrenia Carmi Campus at School of Computer and Instructional Technology Teaching Department students constituted in 2008-2009 academic year. Neutrality is the most important factor in the selection of the sample. Neutrality through the application of the rule can be found in a scientific trial (Karasar, 2005). While doing success assessment, 193 students selected on the basis of first, second, and third classes, and each of the class is divided randomly into two based on the equal numbers. In the first year classes, the CIT102 ‘Information Technology in Education’ course, from the second year CIT210 ‘Computer Hardware’ course, from the third year, CIT 306 ‘Computer Network’ courses has been identified as a sample lessons. While teaching the first group, ICT based teaching method has been applied and while teaching to second group, the teaching method is selected as Classic. In the first year courses and lessons, there were 63 people in the class as a total and 32 of this people were in the first group and second group was identified as 31 people. In the second year courses and lessons, there were 78 people in the class
as a total and 39 of this people were in the first group and second group was identified as 39 people. In the third year courses and lessons, there were 52 people in the class as a total and 26 of this people were in the first group and second group was identified randomly as 26 people. On the other hand, 193 questionnaires prepared in order to apply on students. 2 questionnaires were not taken into consideration and implemented on students. Both questionnaires, returned because of lacking in terms of attendance, personal information, and lack of content. All of the total valid questionnaires (191 students) have been entered to SPSS 16.0. All questionnaires practices have been conducted by Instructional Technology Teaching Assistants indifferently.

2.2. Data Collection

ICT Applications Assessment survey and students success levels are used as a data collection tool in this research. On the other hand, questionnaires, which developed, by Margaret Cox, Christina Preston and Kate Cox King's College London, Miranda Net Project University of Surrey (Paper presented at the British Educational Research Association Annual Conference, University of Sussex at Brighton) have been used in this research as a data collection tool as well. The questionnaire consists of two different parts. The first part contains questions and details about students, the frequency of use of computers by student and which ICT Tools he/she used. The second part contains questions related to ICT Applications and motivation. The second part of this 4 dimensional questionnaire, consist of questions according to student’s opinion; about the need of educational ICT applications, willingness to attend training during the implementation, applications and effectiveness of education and learning with ICT applications to identify problems.

2.3. Data Analysis Method

The views and success rates on ICT applications and success of The American University students studying at the Department of CITT is described by the frequency, percentage and by the arithmetic average. Because of the success rates containing the inferences, Independent and Dependent Sample method is used and Z statistics test which is used in Large Samples, because of the inferences Concerning the Difference Between Two Independent Means (Again in Large Samples). In order to check the validity of the survey, Reliability Analysis-Scale (A L P H A) test is applied on the questionnaire and alpha determined as $\alpha=0.8639$. The “t test” is applied in order to check an overall differences or similarities regardless to gender and age among the groups. The meaningful test rate of the test was 0.05. Moreover, "SPSS 16.0" package is used in statistical analysis. The questions in the survey are appropriately graded according to the 5-point Likert scale.

2.4. Reliability and Validity of Measurement Tool

The ICT assessment questionnaire is used as a data collection tool in the survey. The questionnaire is formed and created by the information about literature review, combination of information gathered from literature review, benefiting from the similar studies and producing of new materials and information, views and ideas of lecturers from American University, Ankara Gazi University and 3 experts from Computer Information Systems Department of European University of Lefke. The questionnaire contains 27 items. The validity of the test is related with the how well a concept or characteristics of the individual measured accurately and how well that test has done this. Different classification techniques can be mentioned for the validity. The following list is the most preferred ones. (Büyüköztürk, 2007, s.167)

1- Content validity  
2 - Criteria - dependent validity  
3 - Structure validity

The validity of the survey were analysed for the substance, and items are below the article analyses correlation coefficient 0.30's, were excluded from the survey. Reliability coefficient was found to be 0.8639.
Survey was organized into two sections. The first section contains questions and details about student, how often he/she used ICT tools and what type of ICT tools he/she used. In the second section, the second part contains questions related to ICT Applications and motivation. The second part of this 4 dimensional questionnaire, consist of questions according to student’s opinion; about the need of educational ICT applications, willingness to attend training during the implementation, applications and effectiveness of education and learning with ICT applications to identify problems.

Reliability can be defined as consistency between individuals' responses to test items. Reliability of the test is related to the measure degree whether that test is measuring correctly the test properties or not. Test reliability of the correlation coefficient is calculated as \( r \), is used to interpret test scores of individual differences and whether how much it is related with error factor. Kuder Richardson-20 (KR-20) and Cranach Alfa (\( \alpha \)) reliability can be given as one of the major reliability type. (Büyüköztürk, 2007, s.167).

3. Findings and Discussions

In this chapter, the information that is taken from this research ‘ICT Based Education’ and ‘Classic Teaching Methods’ the ideas about achievement assessment of education groups, and the importance of applications of ICT, the participation need while on-going education, the effectiveness to this on-going education and that is investigated the troubles when we apply this ICT based education in applications and under the titles of comment critiques.

In the first section of this chapter, ‘Z’ statistics parameters, formulas and criteria were developed and data obtained (indicated in table) were applied the order measure academic success.

3.1. Inferences Involving Two Populations

In this study Inferences Involving Two Populations has been applied. This method falls into two categories, which described as follows;

a. Independent and Dependent Samples:

Independent samples are obtained by using unrelated sets of subjects; dependent samples result from using paired subjects. The study includes two populations. When comparing two populations we need two samples, one from each. Two basic kinds of samples can be used: Independent and Dependent. The dependence or Independence of a sample is determined by the sources used for the data. A source can be a person, an object, or anything that yields a piece of data. If the same set of sources is used to obtain the data representing both populations, have dependent sampling. If two unrelated sets of sources are used, one set from each population, have independent sampling.

b. Inferences Concerning the Difference Between Two Independent Means (Large Samples)

The comparison of the mean value of two populations is a common objective. The difference between two independent mean is (Large Samples) (Johnson, 1980, p347). When comparing the means of two populations, we typically consider the difference between their means, \( \mu_1 - \mu_2 \). The inferences to be made about \( \mu_1 - \mu_2 \) will be based on the difference between the observed sample means \( \bar{x}_1 - \bar{x}_2 \). This observed difference belongs to a sampling distribution, the characteristic of which is described in the following statement.

If independent samples of size \( n_1 \) and \( n_2 \) are drawn randomly from large populations with means \( \mu_1, \mu_2 \) and variances \( \sigma_1^2 \) and \( \sigma_2^2 \), respectively, the sampling distribution of \( \bar{x}_1 - \bar{x}_2 \), the difference between the means,

1. Is approximately normally distributed

2. Has a mean of \( \mu_1 - \mu_2 = \bar{x}_1 - \bar{x}_2 \)

Formula (1)
3. Has a standard error of $\sigma_{\bar{x}_1 - \bar{x}_2} = \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$

Formula (2)

This normal approximation is good for all sample sizes if the populations involved are approximately normal. When non-normal populations are involved, the approximation is good if the sample size ($n_1$ and $n_2$) are both larger than 30.

Since the sampling distribution is approximately normal, will use the $Z$ statistic in our inferences. In the hypothesis test $Z$ will be determined by

$$Z = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

Formula (3): Hypothesis test $Z$, if both $\sigma_1$ and $\sigma_2$ are known quantities

Suppose we are interested in comparing the academic success of Computer and Instructional Technology Teaching students who belong to ICT-Based Education groups with the success of those who do not belong to ICT-Based Education (Classical Teaching Method) groups. These two groups are clearly separate, and we should take independent samples from each of the two populations. The ‘ICT-Based’ groups claim academically at a high level no lower than the classical Teaching Method groups. Cumulative grade point average is the measure of academic success. Samples of size (n) ICT-Based members ($g$) and for the (n) Classical Teaching Method Groups members ($h$) Assume that the standard deviation of both populations is $\sigma = 0.6$. Complete a hypothesis test of the students’ claim, using $\alpha = 0.05$.

The hypothesis for this project is as follows

**STEP 1**

$H_0: \mu_g = \mu_h$ (\geq), or $\mu_g - \mu_h = 0$ (\geq) (No lower)

$H_0: \mu_{ICT-Based} = \mu_{Classical Teaching Methods}$ (\geq), No lower or

$\mu_{ICT-Based} - \mu_{Classical Teaching Methods} = 0$ (\geq) (No lower)

**STEP 2**

$H_1: \mu_g < \mu_h$, or $\mu_g - \mu_h < 0$ (lower)

$\mu_{ICT-Based} < \mu_{Classical Teaching Methods}$ or $\mu_{ICT-Based} - \mu_{Classical Teaching Methods} < 0$ (lower)

The null hypothesis is usually interpreted as being ‘there is no difference between the means’ and, therefore, it is customary to express it by $\mu_1, \mu_2 = 0$.

**STEP 3:** The test statistics used will be $Z$. The test criteria for $\alpha = 0.05$ will be as shown in the figure 3.

The test criteria for $\alpha = 0.05$ will be as shown in the diagram (the test static $Z$).
3.2. Reliability of the Surveys Used

A reliability analysis was carried out using SPSS v16 and Cranach alpha ($\alpha$) factor of 0.8639 was found. Because $\alpha \geq 0.7$ this method is reliable. In this case questionnaires are reliable. It is also shown on Figure 1 below.

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Reliability

***** Method 1 (space saver) will be used for this analysis *****

RELIABILITY ANALYSIS - SCALE (ALPHA)

Reliability Coefficients

N of Cases = 191.0                  N of Items = 23

Alpha = .8639
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Figure 1. Results of Cranach Alpha Reliability Test

4. Conclusion and Critical Analysis

Facts cannot be considered as scientific unless they can be measured. This study scientifically proves that ICT-Based Education presents unmatched opportunities in teaching and learning. In this study a sample from the American University is analysed and it is concluded that ICT-Based Education has improved the motivation and success of students. Education is a great investment for the future. When investing in education, predicting future parameters and moving according to predictions is an essential part in the education process. In such an important subject, the use of technology cannot be avoided at all. The global trend is to depend on firm-founded statistics and research results.

Nowadays, computers constitute the major product of technology advancement across the globe. However, all tools that help us reach knowledge, process knowledge or use knowledge are considered to part of information technologies. Presently, many techniques are developed to produce, collect, and store and distribute needed or desired knowledge. ICT-based application is the most important factor in education. The results and outcomes found in this research show that students accepted ICT-applications and adapted the usage, ergonomics, personal management and the technological easiness that is embedded in this process. By the birth of ICT-based education, a lot of innovation and change have occurred in education. ICT-based educations serve the purpose of both attended and non-attended (distance) education types. In summary, it helps people to access educational classes regardless of geographical distance or obstacles. In contrast to classical teaching methods, where attendance is counted compulsory, the students may have their classes conducted with or without having to physically take part into classes by the virtue of ICT-based education. In this way, students and instructors may have links or connections to each other using ICT technologies.

In this research, the aim is to explore the opinions of students who study at TRNC universities about ICT-based education and its related tools. Research outcomes cover the students of the department of Computer and Instructional Teaching Technologies of the American University (Faculty of Education) who took part into the ICT survey during the academic year. First, second and third year students have been selected randomly for participation into the ICT-based education. This random process covered a total of 193 students. Data collected is done using a survey. The survey has been prepared according to certain rules mentioned in related textbooks, published papers and Internet resources. Moreover, expert individuals in the field are consulted for a quality survey. The survey included 27 questions that covered 4 dimensions. The dimensions are as mentioned here; (1) Opinions in accordance with an achievement assessment, (2) Willingness to participate during the learning of ICT applications, (3) Impact of ICT applications to education, (4) Problems during the learning of ICT applications.
After implementing the survey, a probabilistic approach called the “t test” has been carried out to see if any difference existed between ICT-based class and classical teaching method class. Moreover, in making the comparison, a variance analysis is also done using the grades achieved by students in their corresponding classes. A standard deviation of 0.05 has been considered. The data obtained in this research have passed through a comparison filter. This is true for all data in our basket. Comments have been written and edited accordingly.

In this research which do The American University Computer and Instructional Technology Teaching Department students, Information, conduct and Communication Technology-based education has been stressed to be a must in our century. ICT-based education will soon become a forcing method that will show its influence in all scientific, technologic and social fields. Facts cannot be considered as scientific unless they can be measured. This study scientifically proves that ICT-Based Education presents unmatched opportunities in teaching and learning. In this study a sample from the American University is analysed and it is concluded that ICT-Based Education has improved the motivation and success of students.

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