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THE EFFECT OF INFORMATION TECHNOLOGY IN TEACHING PHYSICS COURSES

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ABSTRACT: In this study, we investigated the effect of information technology in teaching physics course, in students. In order to prove this claim, we design a questionnaire consisting of 12 questions. The gathered answers from student were categorized as “right”, “wrong” and “no responded”. Survey of 150 students from high school in qualitative and quantitative is performed. Also we considered scores of physics course in previous and later of use information technology in teaching for related students as parameter in evaluation research. For enhance the accuracy of these questionnaires we were interviews with 25 students. The result of this investigation, show that there is Significant relationship between information technology and teaching physics courses. Based on the results obtained from this study suggestion were presented to enhance use of information technology.

Key words: Information technology, teaching physics course

INTRODUCTION

Information technologies in education refer to teaching and learning the subject matter that enables understanding the functions and effective use of Information and Communication Technologies (ICTs)[1-2]. As of 2004, a review and the literature on teaching ICT[3] as a subject implied that there was limited, systematically-derived, quality information. In order to use technology effectively, educators need to be trained in using technology and they need to develop a good understanding of it. Information Technology[4-5] is used to enhance learning; therefore it is important for educators to be comfortable using it to ensure that students get the full advantages of educational technology. Teaching with technology is different from teaching in a typical classroom. Teachers must be trained in how to plan, create, and deliver instruction within a technological setting. It requires a different pedagogical approach. Teachers must find a way to assess students on what they take away from a class and meaningful, known knowledge, especially within an eLearning setting. Education will only change when our design methods, perspectives, and values change. Teachers have many roles when instruction is designed. They can be artists, architects, craftspeople, and engineers. Technology does not mean that using interactive electronic boards and LCD PowerPoint presentation is the most effective. So many more applications are available for students to be hands-on with their learning and gain deeper knowledge than they could before. Technology training appears to focus mainly on technology knowledge and skills while overlooking the relationships between technology, pedagogy, and content. As a result, teachers learn about “cool” stuff, but they still have difficulty applying it for their students’ learning. Teacher candidates need opportunities to practice effective technology integration strategies in supportive contexts during technology courses, technology-integrated methods courses, and field experiences. Experienced teachers also need opportunities to learn about new technologies and ways to integrate them effectively in their classroom. Teacher education programs can facilitate improvements not only in students’ technology skills but also in their beliefs and intentions regarding integrating technology into instruction. Technology training directly affects pre-service teachers’ self-efficacy and value beliefs, which in turn influence their student-centered technology use.

However, physics as a science oriented course or discipline is known for its abstract nature (having nonmaterial existence). Sometimes the physics teacher does not have adequate knowledge, but have to fall on ideas which lead to contradictions with what the physics theory says or meant. Students are left on their own, even when they

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are to read on their own, they find no material to read, where it is available most of them are obsolete material. That is, some of these materials include textbook, journals, research publications and news papers e.t.c. where these materials are lacking the students are forced to lose interest, motivation and passion; in some cases frustration sets in and students abandon the discipline or subject matter (physics) for another which they can cope with i.e.

students leaving science class because of physics to commercial or Art subjects, simply point to the fact that other disciplines are not abstract in nature like that of physics. However, physics is a unique subject, which promotes the acquisition of specialized science skills and Knowledge, which explain the natural phenomena of life in the society. It is a subject that grew up with civilization as man's quantitative needs increased. It arose out of practical problems and mans need to solve these problems. It has contributed to the development of the sciences and to the development of civilization. Despite the abstract nature of physics its teaching is to bring about scientific thinking in students; a mindset that requires students to test out, through experimentation. However, through the use of IT, whether CD-Rom, power point, etc the teaching and learning of physics is interesting.

Information Technology in physics teaching

Schools' access to Information and communication Technologies (ICT)[7] poses tremendous challenges to physics teaching and learning. Physics is one of the first areas where the possibilities that computers may offer for the employment of new teaching methods have been and are still explored. A variety of computer applications have been developed and used in teaching Physics, such as computer-based laboratories, multimedia, simulations and intelligent tutors. Furthermore, research has often been employed to direct educational software design and development. Today numerous IT applications are available, aiming to stimulate students' active and offering the opportunity to work under conditions that are extremely difficult, costly or time-consuming to be created in the classroom or even the physics lab. The use of such IT applications has developed a new research field in physics education. Among the various IT applications, Information Technologies are of special importance in Physics teaching and learning. Information Technologies offer new educational environments, which aim to enhance teachers' instructional potentialities and to facilitate students' active engagement. IT offers a great variety of opportunities for modeling concepts and processes [8-9]. IT provides a bridge between students' prior knowledge and the learning of new physical concepts, helping students develop scientific understanding through an active reformulation of their misconceptions [10]. Specifically, they are developing their understanding about physical laws through a process of hypothesis-making, and ideas testing and isolate and manipulate parameters and therefore helping them to develop an understanding of the relationships between physical concepts, variables and employ a variety of representations (pictures, animation, graphs, vectors and numerical data displays) which are helpful in understanding the underlying concepts, relations and processes and express their representations and mental models about the physical world investigate phenomena's which are difficult to experience in a classroom or lab setting because it is extremely complex, technically difficult or dangerous, money-consuming or time-consuming, or happen too fast.

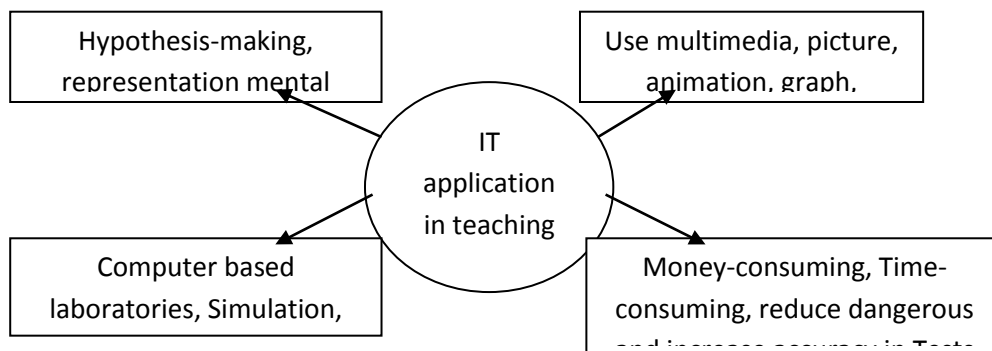


Figure 1. IT Applications in teaching physics course

Today a wide variety of educational software is available for teachers and students helping them to present and model physical phenomena and processes, or solve physics problems. Computer simulations have been successfully applied from high school to university physics teaching. They have been used to diagnose and remedy alternative conceptions of velocity, and confront alternative students' conceptions in mechanics. A recent

study showed that simulations were equally effective to micro-computer based labs in facilitating the comprehension of concepts involving the free fall of objects. Other studies focus on the effects of the use of computer simulations on students' conceptual understanding.

Information technology (IT) is concerned with the use of technology in large organizations .In particular, IT deals with the use of electronic computers and computer software to convert, store, protect process, transmit and retrieved information.

METHODS

Purpose of study

This study investigated the effect of IT on teaching and learning of physics course and found out whether students were taught physics with the use of IT materials such as computer system, internet facilities, projector, video player and etc performed better than those taught with textbook and traditional teaching.

Research hypothesis

Information Technology has effect in improving the students learning and knowledge in physics.

Participants

150 high school students, who were attending a physic course in Iran, participated in the study. This physic course is teaching in three hour per week. Of the 150 students. Our research was carried out during the academic year 2011-2013 and took place about 5 months after students had received school teaching on basic physic concepts. Physics is the first teaching topic described in the Iran Ardebil high school Curriculum.

The educational intervention

Our educational intervention took place approximately one year after students in the experimental group had received traditional classroom teaching on the relevant topics. All students from the experimental group were offered two 2-h lessons in the Information Technology lab. During the year lesson the teacher, with the collaboration of a researcher. Furthermore, all students had a short period of practice in order to familiarize with the Information Technology environment.

During the lesson students were engaged in tasks demanding the use of Interactive Physics representations. They also used the simulation software to represent various physical quantities in graphical form, understand the relationships between physical concepts and, finally, to develop an in-depth understanding of the physical laws. Students in the experimental did not use other Technology to experiment with other types of trajectory in physic course.

Instrument

Data were collected using two basic instruments namely: Information Technology Effect on Teaching Physic course (ITETP) the instrument was a structured questionnaire. The ITETP was used to collect information on respondents' Quantitative –Information Technology Effect on Teaching (QITET).

This measurement tool can be used for finding out the high education school students' about their physic problem with use of Information Technology. After implementation of the inventory to 150 students from different classes (2th,3th, 4th) compare result of inventory, The results are presented in the table 2.

Qualitative – Focus Interview

After completion of the implementation of the inventory, teachers choose twenty five students from classes according to their interest and success with Information Technology. One of the researchers conducted a focus group interview with a structured interview form. The questions below were asked to the students:

Did you have difficulty with the Information technology?

How much IT has been effective in the process of doing physics experiments?

Is the IT accurate than the traditional approach of physics experiments?

What was your favorite aspect of Information technology?

Do you like teaching with Information technology?

Do you use information technology in your interest towards physics has been effective?

Of the 25 students who participated to the focus group interview, 12 were female and 13 were male.

Context and Process

The research tool was a questionnaire based on open-ended questions. This questionnaire was administered to all students in using Information Technology Effect on Teaching (ITFT). Students were asked to answer questions based on descriptions of the tasks and provide the necessary justifications to their responses. In particular, the students were asked to evaluate qualitatively the experimental processes of the tasks. The questionnaire included questions concerning the concepts of topics physic field. The questions focused on two parameters: before use of Information Technology and the use of the Information Technology in teaching physic course. The statistical treatment of data collected was analyzed using statistical packages for social science (SPSS) and these include: Simple percentages Chi – Square. In compliance with a pre –study of the instrument was carried out and tested with Cronbach alpha coefficient and a reliability coefficient of 0.91 was obtained, which showed a strong reliability of the research instrument.

RESULTS and FINDINGS

Data analysis

The data analysis and results are presented with special reference to the research two hypotheses in the use of the IT study. Student-based research group, and the status of the problem is properly assessed, measured in accordance with Table 2 were designed based on this table were analyzed.

Table 1. Show respond for questionnaire

Respond
Empty (E)
Right (R)
Wrong (W)

H0: Information Technology will not have any significant impact on teaching and tear ling of physics.

In testing the above hypothesis, Chi-square statistics was adopted using question asked to ascertain the use of IT in enhancing teaching and learning of physics. The results are presented in the table below:

Table 2. ICT will not have any significant effect on teaching and learning of physics

Respond	observed	Expected
R	13	50
W	135	50
E	2	50
Total	150	150

$$\chi^2 = 217.96 \quad df = 2 \quad \text{Sig} = .000$$

According to table2, $\chi^2 = 217.96$, $df = 2$ and $p < .01$ show that participants believe that ICT has positive effect on teaching and learning of physics.

CONCLUSION

If our schools throughout the country are to maintain maximum educational standards, they should be Provided with adequate funds, infrastructural facilities in terms of modern classrooms equipped with electronic computer system which are connected to internet, well equipped laboratories, workshops, Libraries, instructional materials and highly qualified personnel that can effectively utilize these resources. With the introduction of information and communication Technology, a new challenge for science and physics education has emerged.

Information Technology is significant because it is necessary for the development of our educational system. Therefore, there is no doubt that the world are in the grip of a telecommunications resolution. This means that we are at the advantage to develop our educational system to meet the demand of other developed countries. So the need for information Technology is of great advantage for our schools. Schools should be introduced to IT so that government will pay more attention to educational system of the country and provide necessary support to the growing trend of education to meet the standard of the developed countries.

Finally, our high school students should be given the best in education with modern facilities which will in turn draw out the best in every student and ensures the utility of these students to the development of Iran and the world at large.

RECOMMENDATION

The major focus of the study was actually to evaluate the Effect of Information Technology on teaching and learning of physics in our high schools. Based on this investigation, it is considered very important to make the following recommendations:

1. Government should encourage attracting state, local, international bodies and Non-governmental organizations to invest on IT related projects in secondary and high schools.
2. IT equipment and facilities such as internet, and equipment of IT should be made available to all secondary and high schools.
3. Only qualified and competence physics teachers should be have skills in using information technology to teach physics course in classrooms.
4. Physics teachers should be encouraged to study further in the IT.
5. Attention should be paid of facilities in our secondary and high schools. Also ICT system together with necessary peripherals should be bought. This will enhance the teaching and learning of physics and allow discovery of more facts.
6. Conferences, seminars and workshops and relevant programs should be organized by professionals of IT to teach physics teachers and science teachers on modern technology and its uses.
7. IT relevant curriculum should be developed specially for primary schools, secondary schools and institutions.
8. Establishing facilities for electronic distance learning networks opportunities in our schools.
9. Creating IT Application, in Research Design and Development strategy.

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