AN EXPERIMENTAL STUDY OF TEACHING PHYSICS THROUGH COMPACT DISK PROGRAMS OF ALLAMA IQBAL OPEN UNIVERSITY ISLAMABAD AND THROUGH LECTURE METHOD OF TEACHING

Kiran Joseph
Dr. TayyabAlamBukahri*
Dr. MaqusdAlamBukahri**
SumaeraMehmood

Abstract

Education is a powerful instrument of socio-economic and political change. Hence, it is necessary to improve quality of education at different levels of its field. Teachers need to be qualified in teaching methodology. Improvement of quality of teaching is essential for futuristic development. This is an experimental study of teaching Physics through compact disk programs of AllamaIqbal Open University, Islamabad and through lecture method of teaching. The main objectives of the study were, to investigate the effect of compact disk program on student learning, to compare the effect of teaching physics through compact disk method and lecture method and to recommend more effective teaching methodology in physics. The population for the study consisted of 52 private secondary schools of Rawalpindi city. Only 30 students of 9th class studying in Leaps International Montessori and high school in Rawalpindi city were taken as sample. There were two groups i-e an experimental group (N=15) and a control group (N=15). The control group was taught by lecture method and compact disk programs were taught to experimental group. The experiment was launched for one month, in order to find out the effect

* HOD Foundation University Islamabad,Pakistan.

** Principal of Foundation University Islamabad, Pakistan.

of compact disk program on student's learning achievement. The study was delimited to, school of Rawalpindi city only, to students of 9th class only, textbook of physics of 9th class only and five chapters of physics textbook only. 150 test items were developed in the form of MCQS, fill in the blanks, short questions and numerical in order to check the effectiveness of compact disk program. Analysis of data revealed that the students taught throughcompact disk programs performed significantly better. The study recommends the use of compact disk program to improve the quality of education in science subjects. It recommended that compact disk programs should be provided to the institutions and that teachers need to be provided training to use these compact disk programs to make the teaching of Physics effective.

Introduction

Education is a process of bringing desirable change in the behavior of human beings. It can also be defined as a process of imparting or acquiring knowledge and habits through instruction or study. Knowledge is an appreciation of the possession of interconnected details, which in isolation, are of less value. Progress and advancement of the countries of the world are always related with the kind of education they offer to their people. Modern age is the age of science and technology. Education gives people expertise and skills for different fields to keep them abreast with the changing realities of life. Through historically dynamic socio- scientific process of education, various societies have evolved over the centuries and are recorded in history since 5000 BC. Societies either belong to the old civilizations of Sumeria, Egypt, Greece to the time of Prophet Mohammed (PBUH), Rome and Europe or to the science and technology dominated Global societies of the 20th and 21st century. In all these societies the development in educational concepts and practices existed with their own meanings, philosophies and objectives.

Mundy in his paper indicated a recommendation to the Secretary of State for Education of U.K. It stated that schools must prepare their pupil for the transition to adulthood and working life. Young people need to be equipped with a basic understanding of the function of our democratic system, of the mixed economy and the industrial activities, especially manufacturing, which create our national wealth. It was a direct appeal to schools to play a fuller part in motivating young people towards the world of work. Mundy also suggested alteration in the content and

balance of certain areas of curriculum, provision for more guidance and counseling, and extension of work experience (Mundy, 1978).

Information technology is comprised of computers, networks, satellite communications, robotics, videotext, cable television, electronic mail, electronic games, and automated office equipment. Widespread use of technology is changing the way we work, learn, and communicate-even the way we carry out our regular, daily activities. In higher education, technology has had a dramatic impact on teaching and learning, including service-learning experiences. Service-learning classes and activities can be augmented through the use of technology to provide more effective experiences for faculty, students and community participants. With their ready access to new technologies, higher educational institutions are well positioned to take advantage of rapid changes in the field.

The AllamaIqbal Open University developed physics compact disk to upgrade the teaching methods and improve the student's knowledge. In compact disks the pedagogical aspects and contents of physics are given in an integrated manner. The compact disks are expected to help the prospective teachers to carry out their responsibilities in an effective way. Education in the largest sense is any act or experience that has a formative effect on the mind, character or physical ability of an individual. In its technical sense, education is the process by which society deliberately transmits its accumulated knowledge, skills and values from one generation to another.Technology can be defined as "human innovation and action that involves the generation of knowledge and process to develop systems that solve problem and intend human capabilities.

This study has been designed to investigate the effectiveness of teaching physics through compact disk programs of AllamaIqbal Open University, Islamabad in comparison with the teaching of physics through lecture method.

The objectives of the study were:

1. To investigate the effect of compact disk program on student learning.
2. To compare the effect of teaching physics through compact disk method and lecture method.
3. To recommend more effective methodology in teaching physics.

Significance of the study

I. The study may be significant in showing the effectiveness of one teaching method over the other.

II. This study is likely to increase teacher's motivation for teaching in the science subjects with the use of modern methods.

III. The findings of the study are likely to help teacher trainers in including new methods of teaching in the teacher training programs.

IV. Policy makers, curriculum planners and administrator may think seriously for searching such means, methods and innovations like compact disk that may be beneficial in classroom situation in the teaching of physics.

METHODS

The population of the study consisted of 52 private secondary schools of Rawalpindi city.

The students of 9th class of the Leap International Montessori and a high school in Rawalpindi city were selected as a sample of the study. Only students studying Physics as elective subject were included the sample.The sample of the study consisted of 30 students chosen from 9th class. Students in the sample were assigned to two groups i.e. an experimental group and a control group. Each group comprised of 15 students. The control group was taught through lecture method and the students of experimental group were taught through a compact disk program.

The test was developed on 150 test items, which included MCQS i.e. fill in the blanks, shorts answers and numerical type of items.

60 test items were developed from the first two chapters of physics textbook for 9th class.

1. Introduction of physics
2. International system of units.

90 test items were developed from the following three chapters

3. Scalars and vectors.
4. Energy
5. Properties of matter.

The experimental group was taught through compact disk programs and the control group was taught through lecture method.Both the groups were taught by a team of two teachers i.e. Miss Kiran and Sir Waqar. Duration of the teaching was four weeks (six periods of 40 minutes, each week). Both the groups were fresh; hence, treatment post- test design was used to see the effect.Data were analyzed with the use of SPSS. T-test was used for data analysis.

Objective of teaching physics at secondary level by ministry of education, Pakistan

Promotion of process skills, problem solving abilities and application of concepts, Useful in real life situation for making physics learning more relevant, meaningful and stimulating.

The objectives of the physics course at secondary school level are to enable student to:

1. develop interest, motivation and sense of achievement in the study of physics
2. develop the ability to describe and explain concepts, principles, systems, processes and applications related to physics.
3. develop the thinking process, imagination, ability to solve problems, data management, investigating and communication skills.
4. develop an attitude of responsible citizenship, including respect for the environment and commitment to the wise use of resources.
5. recognize the usefulness and limitations of scientific method and the interaction between science, technology and society.

Educational technology

According to Scott Adams (2004) the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources.Educational Technology (Information Technology) according to International Technology Education Association.

- Teaches with technology (uses technology as a tool)

- Primarily concerned with the narrow spectrum of information and communication technologies
- Primary goal: To enhance the teaching and learning process

According to Collins (1992, p.24) Technology provides us with powerful tools to try out different designs, so that instead of theories of education, we may begin to develop a science of education. But it cannot be an analytic science like physics or psychology; rather it must be a design science more like aeronautics or artificial intelligence. For example, in aeronautics the goal is to elucidate how different designs contribute to lift, drag maneuverability, etc. Similarly, a design science of education must determine how different designs of learning environments contribute to learning, cooperation, motivation, etc.

Teaching Machines

Learning usually involves both a student and a teacher. But in the recent tooling up of the educational system, the teacher need not be physically present to teach. Of late, both the student and the teacher are vitally concerned with the question of acquiring information most rapidly and efficiently. Various teaching techniques have been developed and tested and some have proved their efficiency in this respect. Teaching machines and Programmed Instruction represent thisnew development in education and have attracted considerable amountof interest recently. "Teaching machines and Programmed materials arenot monsters designed to enslave thought and turn teachers and students into robots."

Ateachingmachine is a piece of device designed to be operated by an individual student. It can interact with the student to a remarkable degree. The essential characteristics of the various teaching machines are as follows:

1. The student is presented with a question or problem by some form of display on the machine.
2. The student is required to respond overtly. The student must do something about the problem, either to write an answer or to push a buttonto indicate the correct answer.
3. The student is informed as to whether his answer is right or wrong. This is being

done either by showing the correct answer or by moving forward to the next frame when a question has been answered correctly.

4. An account is kept of the Reponses made by the student not for the purpose of testing the acquisition of knowledge but for teaching purposes.

Compact Disk

Compact disk is the output device convert computer data to human understand data. The Association provides an outstanding example of videocassette technology being used in this sector for Media Based continuing education for engineers, a consortium of 21 universities teaching engineering, with headquarters in Atlanta, Georgia, which distributes over 500 engineering courses, particularly for continuing education on video cassette. Most of the videocassettes were recorded during lecturers in one of the 21 universities although some were record especially in studio (Hawkridge and David, 1983).

According to Rashid (1993, p.33) programs are not viewed from beginning to end, but in sequences that depend upon responses made by the user on the controller or keyboard. Incorrect responses result in the provision of further information, which clarifies the issues, followed by a re- test. A correct response enables the program to continue.

Role of compact disc in AIOU

The AIOU describe the use of computers as instructional material by academicians in the teacher- training program at AIOU Islamabad, to show the approach of planners regarding courses for the use of computers as instructional materials in teachers-training programs of AIOU and to discuss integration of computer instruction and the teacher's training-programs at AIOU Islamabad. Considering time as a factor, most of the students agreed that an instructor/ resource person might have the ability to set time for the computer based instructional material in the classrooms.The main purpose of the use of computer based instructional material might be to train teachers who might become comfortable with the use of educational technologies. These trained teachers might go to their schools or institutions use these technologies to their students

in the schools where they work. Exposing the students of these trained teachers to the technologies may be considered as a secondary outcome of this study.

Since the emphasis of the present study was to develop a computer based instructional material model for teacher training program at AIOU and there was a need of further detailed research in this regards to set up the details of the infra structure at the school. It was recommended for future researchers to carry out any detail at the school level. AllamaIqbal Open University may incorporate computer based instructional materials in teacher training programs at AIOU Islamabad. The computer based instructional material model may be used in all the teacher training classes of AIOU Islamabad. Textbooks and text material may be modified according to the use of computer based instructional material model in teacher training classes of AIOU Islamabad. Internet, CD-ROM, and websites may be available to the students of teacher training classes of AIOU Islamabad. Text materials may be available on CD ROM to the students of teacher training classes of AIOU Islamabad. Use of email may be frequent and available to the students, staff and faculty of teacher training classes of AIOU Islamabad. It would be beneficial to conduct a study to see performance of the students in the multimedia classes that use computer based instructional material.

RESULTS

The units, which are derived from base units, are called derived units

Groups	No. of students	X	SD	T	P
Control group	15	1.93	.258	.32	*<0.05
Experimental group	15	2.00	.000		

*Significant Df=28 t at 0.05= 2.05

Table 1 show that calculated t- value is .32 which is less than 2.05, table value at DF 28.It means that there is significant difference between the score of control group and experimental group. It also reflects that conceptual studies of the physics topics with compact disc method are more significant as compare to lecture method. The learning skills of students through compact disc bring better results.

Length mass, time electric current and intensity of light are some examples of base quantities

Groups	No. of students	X	SD	T	p
Control group	15	1.47	.516	.019	*<0.05
Experimental group	15	1.87	.352		

*Significant Df=28 t at 0.05= 2.05

Table 4 shows that calculated t- value is .019 which is less than 2.05, table value at DF 28.It means that there is significant difference between the score of control group and experimental group. It also reflects that conceptual studies of the physics topics with compact disc method are more significant as compare to lecture method. Better results are shown through compact disc method.

Most common error in measuring volume of a colorless, liquid, we note is Parallax error

Groups	No. of students	X	SD	T	P
Control group	15	1.60	.507	.105	*<0.05
Experimental group	15	1.87	.352		

*Significant Df=28 t at 0.05= 2.05

Table 9 shows that calculated t- value is .105 which is less than 2.05, table value at DF 28.It means that there is significant difference between the score of control group and experimental group. It also reflects that conceptual studies of the physics topics with compact disc method are more significant as compare to lecture method. Students learn more through compact disc.

The least count of vernier calipers is 0.1mm

Groups	No. of students	X	SD	T	P
Control group	15	1.47	.516	.061	*<0.05
Experimental group	15	1.80	.414		

*Significant Df=28 t at 0.05= 2.05

Table 16 shows that calculated t- value is .061 which is less than 2.05, table value at DF 28.It means that there is significant difference between the score of control group and experimental group. It also reflects that conceptual studies of the physics topics with compact disc method are more significant as compare to lecture method.

Pakistan carried out six successful nuclear experiments under the supervision of Dr. Abdul Qadeer Khan in 1998

Groups	No. of students	X	SD	T	P
Control group	15	1.13	.352	.000	*<0.05
Experimental group	15	1.80	.414		
*Significant	Df=28	t at 0.05= 2.05			

Table 26 shows that calculated t- value is .000 which is less than 2.05, table value at DF 28.It means that there is significant difference between the score of control group and experimental group. It also reflects that conceptual studies of the physics topics with compact disc method are more significant as compare to lecture method.

Astrophysics deals with the Astronomical phenomena

Groups	No. of students	X	SD	T	p
Control group	15	1.53	.516		
Experimental group	15	1.93	.258	.012	*<0.05
*Significant	Df=28	t at 0.05= 2.05			

Table 43 shows that calculated t- value is .012 which is less than 2.05, table value at DF 28.It means that there is significant difference between the score of control group and experimental group. It also reflects that conceptual studies of the physics topics with compact disc method are more significant as compare to lecture method.

CONCLUSION

The following conclusions were drawn in the light of the findings of the study.

1. There was a significant difference between the teaching of physics through compact disc program and through lecture method. Teaching of physics through compact disc program was more effective than teaching through lecture method.
2. It was revealed through analysis of data thatStudents taught through the compact disk program method outscored than the students working in traditional learning situation. Compact disk program method is more effective as a teaching learning technique as compared to lecturer method.
3. It was revealed through analysis of the data thatTechnology can be defined as "human innovation and action" that involve the generation of knowledge and process to develop systems that solve problems and improve human capabilities.
4. According to the students taught by compact disc programs, there was a lack of information technology compared to the needs of students.
5. This study indicated that there was a significant difference between the teaching of physics through compact disc program and through lecture method and the students of compact disc program get the chance to enhance their learning but on the other hand students taught through of lecture method did not get the chance to enhance their skills due to the lack of IT resources.
6. The students of Experimental Group were highly active and enthusiastic as compared to those of Control Group students.
7. Students of Experimental Group answer the teacher's questions more effectively as compared to those of control Group students. The students of Experimental Group remember the shape of the objects, dialogue, and models discussed in compact disk program.
8. The reaction of the students in was positive. The performance of the students of Experimental Group was better as compared to those of control group students. There was a significant difference between teaching physics through compact disk program and lecture method.

9. Compact Disk is an interactive instructional technique because Compact Disk is used to present the instructional material and monitor the learning that takes place; it uses a combination of text, graphics, sound and video in the learning process.
10. Widespread use of technology is changing the way we work, learn, and communicate-even the way we carry out our regular, daily activities. In higher education, technology has a dramatic impact on teaching and learning.

DISCUSSIONS

This study has been designed to investigate the effectiveness of teaching physics through compact disk programs of AllamaIqbal Open University, Islamabad in comparison with the teaching of physics through lecture method.

In the teaching of science a major objective is to develop student's problem solving capacities. Victor, E. (1975, pp.20-27) has says that the main objectives of science is to help the children learn science concepts and conceptual schemes that help them understand and interpret their environment. When the children learn science content, they learn, not memorize. When children learn the process of science, they gain insight and practices in different methods that scientists use in order to solve problems. The children can think critically when making discriminative observations, when organizing and analyzing facts and concepts, when giving reasons for outcomes, when evaluating and interpreting the results of experiments, and when drawing justifiable conclusions. Science objectives help students to discover, to interpret, to think critically and to solve their problems. Compact Disk is an interactive instructional technique whereby Compact Disk is used to present the instructional material and monitor the learning that takes placed. It uses a combination of text, graphics, sound and video in the learning process. The students of Experimental Group were more active and enthusiastic as compared to those of Control Group students.Students of Experimental Group participated more on the teacher's questions as compared to those of control Group. The students of Experimental Group remember the shape of the objects, dialogue, and models discussed in compact disk program. The performance of Experimental Group studentswere better and student's achievements also reflected the method of teaching. There was significant difference between teaching physics by

compact disk program and lecture method. There was significant difference in student's achievements reflected by the teaching methodology. Students respond to information differently. Thus, it is often to our advantage that teachers use many different formats and modes to teach the subject matter of a lesson. This is why teachers normally use some combination of lecture, text and laboratory method for conveying information. With the advent of the Internet and the multiple formats that can be communicated over the World Wide Web.The Web allows the incorporation of animation, moving pictures, and sound into lessons, which extends abilities to present materials that encourage student interaction with the subject matter. Pictures and animations help bring to life scientific principles, and multimedia allows students to take a more active role in learning: they can watch experiments in action, see micro-organisms up close, and use a mouse or keyboard to navigate images, simulations and interactive material. One of the advantages of using multimedia is to convey information quickly and effectively to all students – and keep them interested in learning (Savage and Vogel, 1996).

Computer-based multimedia also helps students to develop technical and research skills that they cannot get from reading a textbook. Since the links and images in our modules are on a computer, students learn how to work with a keyboard, mouse, and to access online information. The modules begin to show students how to use information sources on the Internet by providing links to news archives, journals, and databases outside library. Using Vision learning, students can easily find Web pages of information and library collections that Visionlearning editors describe in the lesson links. When students can see what is going on, they can understand the important points in the lesson and "jump off" so they can discover more about the topic themselves (Mikett and Ludford, 1995).

According to Rashid, M. (1993, p.33)Programs are not viewed from beginning to end, but in sequences that depend upon responses made by the user on the controller or keyboard. Incorrect responses result in the provision of further information, which clarifies the issues, followed by a re- test. A correct response enables the program to continue

Mr.AliAzar completed his studies on the topic Computer-Assisted and Laboratory-Assisted Teaching Methods in Physics Teaching: The Effect on Student Physics Achievement and Attitudetowards Physics from ZonguldakKaraelmas University, Department of Secondary Sci. and Math Education, Zonguldak, Turkey.According to the data analysis, there is a significant

difference on students' physics achievements in favor of the computer-assisted teaching method and also both for two different teaching methods. Thus, it can be said that to develop students' physics achievements and attitudes towards physics using the computer-assisted teaching method can be more effective than the laboratory-assisted teaching method.An article was written by Mr.WatsonMalambo in Rhods University on the topic, Information and communication technology in A-physics teaching and learning at secondary school in Manical Zimbabwe. Main objectives of the study were to determine the extent to which physics teacher and students used studies. Multiple case studies were chosen. A strategy using 10 schools, 15 physics teachers, and 20 A-level physics teachers was used. Questionnaire, Observation and informal and focus group interview were used to elicit the responses. Findings of this study provided the physics teachers with some examples of best practice of what physics teacher can do with ICT in practice of technology.

References

- Akbar, A. (1992). *Advance Educational Psychology*. Lahore: Majeed Book Depot.
- Aldojan, M. (2006).*Internet Use among Education Faculty Members in Jordanian Public Universities*.London: The Scare crow Press Inc.
- Anthony, S.J., Lawrence, W.B.,&Edward, A.W. (1979).*Strategies for Teaching*.London: The Scare crow Press Inc.
- Bullock, L. (1976).Presidential address to the Association for Science Education, *School Science Review, Vol.57, No.201.p.621.*
- Caslin, W.E. (1985). *Thoughts on Lecture Method*. U.S.A: Kansas State Inc.
- .Dhand, H. (1990).*Techniques of Teaching*. New Delhi: Ashish Publishing House.
- Druger, M. (1999).*Science Teacher for 21st Century*. New Delhi: Deep and Deep Publishers.
- Elliott, G. (1984). *Video Production in Education and Training*. London: Croom Helm.
- Esler, W.K. &Esler, M.K. (1985).*Teaching Elementary Science*. (4thed.). California: Words Worth.