Application of ICT for Effective Teaching of Inductive Effect in Aromatic Organic Compounds

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Abstract

Education in general and higher education in particular plays a vital role in the development of human potential and thereby national development. Recently, changes in science and technology have considerable impact on the higher education system which aims at developing the abilities of students to keep pace with changing world. Thus, higher the quality of university education in a country, more prosper and competitive are the people. The present method of teaching by conventional method using chalk and black board has intrinsic weaknesses. On the other hand, ICT in education has positive impact on students' conceptual understanding. By considering the advantages of multimedia computer program for effective teaching of chemistry concepts, researcher developed multimedia computer program on concept of inductive effect in aromatic organic compounds and used it for experimental group of first year science undergraduates. The multimedia program was developed by using various media such as text, graphics, animation and sound. Teaching with use of multimedia program was beneficial to students of experimental group. It was confirmed by t-value. During this work, researcher administered pre-test, post-test, retention test, and sought opinion of students.

Introduction

Quality teaching takes place at three interdependent levels. At the institution level including projects such as policy design, support to organization and internal quality assurance systems. At the program level it comprises actions to measure and enhance the design, content and delivery of the programs within a department or a college. Support for quality teaching includes use of ICT in higher education especially for science undergraduate. ICT can be divided into two components, Information and Communication Infrastructure (ICI) which refers to physical telecommunication system networks (cellular, broadcast, cable, satellite, postal) and the services (Inter Net, voice mail, radio and television). The Information Technology (IT) refers to the hardware and software of information collection, storage, processing and presentation. Teaching and Learning using ICT has become a reality in both the Conventional Education System and the Distance Education System. ICT manages large quantity of information and communicate the same to the concerned people. ICT is not limited to the computers or internet. It ranges from the use of FM radio to the use of satellite for communication. It includes both the form and essence of communication. Considering interactive nature of multimedia computer for proper communication of organic chemistry concepts, researcher developed computer assisted learning package (multimedia software) on the concept of inductive effect in aromatic organic compounds and used it in teaching learning process for experimental group of B.Sc. Part-I students. Researcher developed this software by using various media such as text, graphics, animation and sound. The experimental group was benefited by this software. Researcher administered pre-test, post-test, retention test and elicited opinion of students. It has been observed that multimedia use in teaching –learning of organic chemistry enhanced the understanding of students at undergraduate level. The null hypothesis was tested on the basis of ***t*** value. Thus it is beneficial to use ICT for effective teaching-learning process.

Objectives of the Study

1. To develop multimedia computer assisted learning package on the concept of inductive effect in aromatic organic compounds for B. Sc. I students.
2. To compare the effectiveness of computer aided teaching-learning strategy with the traditional teaching method.

Limitations

1. In the present investigation, the students learning in B. Sc. Part-I in K. B. P. College during academic year 2018-19 were included.
2. The developed software program is based on the contents of point included in the syllabus of Shivaji University, Kolhapur (M.S.), India.

Null Hypothesis

$H_0.1$ The experimental and control groups **will not have** different mean test scores.

Alternative Hypothesis

$H_1.1$ The experimental and control groups **will have** different mean test scores.

Development of a product

The first step was the preparation of the layout and designing the contents to represent the same in interactive software program. Storey-boards were designed by the researcher. Text matter was developed in Microsoft Word which was imported in Macromedia Flash 5.0 where it was aligned frame by frame. Then frames and buttons were designed and developed. All the frames, buttons, pictures and still images were developed in Adobe Photoshop Cs and Adobe Illustrator 11.0. These were considered as a raw material for further designing. Then all the designed frames were imported into Macromedia Flash where all the contents were entered. The buttons and icons were given motion in the same software. The Macromedia Flash was utilized for motion animation and linkages of pages. The content frames were further published in the format of 'Application Files' (.exe). The verbal narration sound was recorded and edited in Sony Sound Forge 8.0.

Design of the Study

In the present research study the investigator followed experimental research design. At the beginning, a diagnostic test was administered on 60 students learning in B. Sc. Part I in K. B. P. College, Urun Islampur, District Sangli, M. S. India. A pre-test question paper was set for 50 marks containing 50 questions with multiple choices and each question was carrying 1 mark. All the questions were based on the chemistry syllabus at +2 level.

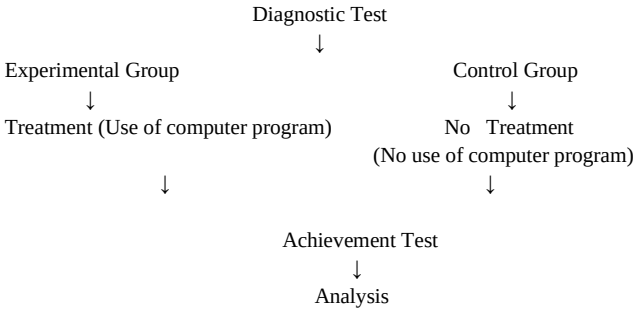

Figure1. Experimental research design

Table1. Comparison of performance of groups in achievement test

Group	Number of students	Mean test score	Variance	Standard deviation	*t* value
Experimental	30	27.25	12.57	3.53	3.64
Control	30	18.77	25.42	5.09	

The *t* test, the test of the significance of the difference between two means is tested at 0.01 level.

Based on the diagnostic test scores, the students were distributed into two equivalent groups. While forming two equivalent groups, the male and female students with equal score were distributed in both experimental and control groups. The experimental group was taught with the help of computer program. Thus they received treatment. The control group was taught with the traditional method of teaching. They did not receive treatment. At the end of the experiment, the achievement test was administered on both groups and their performance in achievement test was analyzed. The questions asked in the achievement test were objective questions with multiple choices, match the pair, questions for short answer and questions for long answers. The total marks allotted for the test were 50. The validity of both diagnostic and achievement tests was done properly.

The mean test score of the experimental group was 27.25 and that of control group 18.77. The mean test scores indicated that there is significant difference between achievement test scores of these groups. The test of the significance of the difference between two means *t* test has the value 3.64 which exceeds 1.96. Therefore, the null hypothesis is rejected at the 0.01 level of significance and alternative hypothesis H_1 is accepted.

Discussion of Results

In this investigation, researcher found that the mean test score of achievement test of experimental group was higher than the control group. The students of the experimental group acquired more knowledge of the concept than the students of the control group. Therefore, incorporation of multimedia program in teaching-learning process results into better performance of the students. It enhances the learning and understanding of concepts of organic chemistry such as Inductive Effect in Aromatic Organic Compounds**.** Thus it is concluded that, use of multimedia program on the concept of inductive effect in aromatic organic compounds is beneficial and may be used as a supporting tool to traditional classroom teaching method. It may be used as per the need and situation of the students.

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