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EFFICACY OF MULTIMEDIA FOR LEARNING ORGANIC CHEMISTRY

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ABSTRACT:

Multimedia is characterized by the presence of text, pictures, sound, animation and video; some or all of which are organized into some coherent program. In the present study, effort has been made to find out the outcomes of multimedia for learning. Objective of the study is to investigate whether using multimedia for learning organic chemistry to undergraduate students is significantly different from learning organic chemistry without the aid of multimedia. In this study the quasi experimental method was used for evaluating efficacy of multimedia for learning organic chemistry. The sample consisted of 70 first year undergraduate students. Each individual was required to complete three testing instruments such as a pretest, posttest and retention test. The findings of the study revealed that an effective way to improve the learning of organic chemistry through multimedia. Multimedia learning ensures that to promote cognitive functions among the learners.

Key Words: *Multimedia, Organic chemistry and Cognitive function.*

INTRODUCTION

The educational system rapidly change in the present day, so the teaching methodology significantly moves towards student centric. It stresses that learning environment should be based on the need and interest of the learner's. So the curriculum might be focused the learner's need, interest and learning capacity. Policy makers consider these emergent issues to framing better curriculum. Now a day technology provide immense assistance for learners in student centric learning. Discovery of computer is one of the most valuable innovation in the field of education and also it provide integrated learning at any time and everywhere. The computer applications like Multimedia, e-content and etc. makes the teaching-learning environment ease. Multimedia learning can enhance the cognitive functions from the learners and it leads the concepts to store long term memory. Multimedia is the combination of text, imagery, audio-visual, graphics and animation. The components of multimedia easily fascinate multiple senses from the learners at same time without span of attention. These learning may possible from multiple senses and when it stored at long term memory in the brain with multidimensional. Learning any type of content with imagery, audio-visual, graphics and animation could be effective than learning only from text materials (Huifen Lin and Francis M. Dwyer, 2010). All the components of multimedia can expand the cognitive process like perception, attention, memory and



remembering. The multidimensional information is stored in cortex region of the brain. Our brain is like a digital computer device that takes information processes it and then produces the behavioural outcomes. This view is called information processing view of mental activity which stresses the flow of information from input to outcome (Mishra, 2008). According to this, learners acquire information from multimedia, the mental or cognitive activities select, transform and stored the acquired information and ultimately the learner does modified behaviour. Memory is an outcome of the information processing.

SIGNIFICANCE OF THE STUDY

Multimedia learning experiences represent a natural way for learning to take place. Learning pace can be accelerated by involving maximum number of senses. Multimedia learning experiences have the advantage of appealing to the individual, the learners pace, interest and readiness. Besides, cognition and conceptualization depend on a chain of events, which begin with the learner's perception of stimuli, be they auditory, visually, and tactile and affectory (Satyaprakasha and Sudhanshu, 2014). It is important that these initial learning experiences be accurate, dependable and understandable. Hence Knowledge about organic chemistry is important from the students who have opted chemistry as their major. Because the applications of organic chemistry is highly importance in the following some fields; like food production and control, pharmaceuticals, dyes, fiber, plastics and other industries. So students become familiar in organic chemistry great success in their future. Multimedia instruction creates the opportunity for learners to improve their learning effectively especially in organic chemistry.

REVIEW OF RELATED LITERATURE

The investigator reviewed some of the most related studies to the topic of this study. Junaidu (2008) analyzed the effectiveness of multimedia in learning and teaching data structures online. Results showed that an online data structure course over five years offering show that students consistently perform much better in questions requiring application of material taught in carefully animated algorithms. Hema (2010) investigated the effectiveness of multimedia strategies in learning botany at higher secondary level. The study revealed that the achievement scores of students using the multimedia package were highest among all the means of treatment and control group with regards to botany learning. Multimedia package gives much interactivity made the learner engaged and interest over the subjects, better understanding of the concepts, videos gives a clear idea about the scientific concepts, animations and pictures increases the memory, repeated drill increases the retention rate improves academic achievement and gives freedom to self-learning. The multimedia package reduces the learning time taken by the learner for learning the concepts. Rosa and Preethi (2012) attempt to find out the effectiveness of multimedia instructional package for teaching marketing management among higher secondary students. Students taught through multimedia instructional package performed better than those who were taught classical method of teaching. Aloraini, S (2012) investigated the impact of using multimedia on students' academic achievement in the college of education at King saud University. The result revealed that the development of the academic achievement for the experimental study was greater than that of control group. This stresses the effective use of multimedia in promoting computer lessons. Theresa and Benjamin (2013) investigated the effectiveness of multimedia in teaching mathematics at under-graduate level. The study revealed that multimedia proved its effectiveness in teaching mathematics at under-graduate level over traditional method. Satyaprakasha and Behera (2014) investigated the effectiveness of multimedia in teaching on achievement of VIII standard students in biology. The study revealed that the multimedia teaching significantly enhanced the achievement with respect to knowledge, understanding and application and total achievement in biology as compared to conventional method and there was no significant difference in achievement among the students of different intellectual level in biology. It concluded that multimedia teaching equally promoted achievement in biology among the students of

different intellectual levels in the experimental group. Singaravelu (2014) investigated the efficacy of multimedia package in communicative skills in English. The study showed the interactive multimedia package was more effective than conventional methods in improving communicative skills in English. Kumar, Sharma and Singh (2015) investigated the effectiveness of multimedia approach on the academic achievement of class 8th students in English. The multimedia package prepared by the researcher for teaching English was found to be more effective for academic achievement of class 8th students.

OBJECTIVE

The present study attempts to investigate whether using multimedia for learning organic chemistry to undergraduate students is significantly different from learning organic chemistry without the aid of multimedia (Conventional Method for Learning).

HYPOTHESIS

Multimedia significantly improves the learning in organic chemistry at under-graduate level.

DESIGN

Quasi experimental method is followed in this study. This is conducted in three phases which are Pre-implementation phase, Implementation phase and Post-implementation phase. In the first phase, the level of performance of the learners and was assessed by means of the pre-test for the first year undergraduate students studying B.Sc Chemistry as their major subject. In the second phase, the investigator implemented the prepared multimedia package. The contents used in this package were nomenclature rules (IUPAC) of aliphatic and aromatic hydrocarbons, compounds containing different functional groups (hydroxyl, aldehyde, ketone, carboxylic acid, ester, ether and amino compounds). In the third phase post-test was given in order to check their acquired knowledge in organic chemistry. Finally retrieval of the students also assessed by means of retention test, conducted after fifteen days from the implementation phase. In this study the students were divided into two groups namely control group and pathway students. Control group administered by the conventional method (CGCM) and the pathway students administered by multimedia package (PGMP). The study was carried out with the students of affiliated colleges of Periyar University. Thirty five first year UG students were used for each group based on the convenience of the investigator. Two types of instruments were used for the study, one is multimedia package and another one is achievement test for pre, post and retention tests.

DETAILS OF MULTIMEDIA

Multimedia refers to any computer-mediated software or interactive application that integrates text, color, graphical images, animation, audio sound, and full motion video in a single application. Multimedia learning systems consist of animation and narration, which offer a potentially venue for improving student understanding (Mayer & Moreno, 2000). Multimedia package was prepared using Adobe Flash Macromedia software. The concept of organic chemistry is organized with systematic manner. The prepared multimedia package having learning objectives and multiple choice questions for self-evaluation. Time limit of the package was 42.37 minutes.

VALIDATION OF MULTIMEDIA PACKAGE

The first draft of multimedia package was subjected to three types of evaluation self-evaluation, expert appraisal and opinion of students. In the self-evaluation, the content portion of the multimedia package was checked about its factual correctness and its relevance with objectives. In the expert appraisal, comments and suggestions were taken about the presentation of the package, and existence of the essential characteristics needed for a package to become a tool for learning, for this suggestions and

opinions of five Professors of Chemistry and experts from Department of Education Periyar University, Salem, TamilNadu, India about the developed multimedia package was taken. To check whether the package was developed according to the mental level of the undergraduate students and was effective in the acquisition a concepts of nomenclature in organic chemistry, 30 students studying in different colleges were randomly selected and feedback about the package was obtained from them. Opinions/feedbacks were included in the package.

RESULTS

The Mean and Standard Deviation of the scores secured by undergraduate students in the Post and retention tests through multimedia of the pathway group and the conventional method of the control group are tabulated and presented in table 1.

Test phases	Group	Sample	Mean	Standard Deviation	t-Value
Post test	Control Group (CGCM)	35	35.91	6.6	7.11*
	Pathway group (PGMP)	35	44.85	3.42	
Retention Test	Control Group (CGCM)	35	30.37	8.08	8.31*
	Pathway group (PGMP)	35	43.08	4.07	

Table-1: Mean, SD and t-value of Scores of post and retention tests of pathway and control groups.

*significant at 0.05 level

From the table the mean of the post test scores of the pathway group learnt through multimedia package is 44.85 with a SD of 3.42. The mean of the post-test scores of the control group taught through the conventional method is 35.91 with a SD of 6.60. The mean difference 8.94 is found to be significant at 0.05 level for 68 df with a 't' of 7.11. Therefore Multimedia significantly improves the learning in organic chemistry at undergraduate level.

The same table (1) it is observed that the mean scores of the students at the undergraduate level in the retention tests for the pathway group is 43.08 and for the control group is 30.37. The difference between mean scores of the post and retention tests of pathway group is 1.77 and same as the difference between mean scores of the post and retention tests of control group is 5.54. Hence, it is concluded that the pathway group had more retrieval in their memory compare with the control group. Hence the multimedia learning leads to long term memory from the learners compare than the conventional method for learning.

DISCUSSION

The investigator believes that the difference in the mean scores of the students was attributed to using multimedia for learning organic chemistry. Furthermore, the differences between the two groups may be attributed to many other reasons.

- + Using multimedia for learning organic chemistry is novelty. This novelty may have encouraged the students to deal with the computer based experiences enthusiastically, which may have been reflected in better achievement.
- + Using multimedia allows the students to repeat the same piece of information or drill as many times as necessary for them to understand. Moreover, they are able to refer to the learning material any time they want.
- + Using multimedia for learning makes the students become less shy of committing mistakes, which encourages them to learn much better and then improve their achievements.
- + Learners using the multimedia might have felt that they were not being observed or adjudicated and, thus, that the work they did was their own private property. Therefore, they were relaxed about

assembling information and seeking help from other students. Finally, multimedia have many positive characteristics such as speed, accurateness, and variability of content presentations.

CONCLUSION

The findings supports the idea that the use of multimedia supports content acquisition and helps increase achievement scores. In particular the results lead one to conclude that an effective way to improve the learning of organic chemistry is to offer multimedia to illustrate the concepts of organic chemistry. Learners were likely motivated to success and achievement in learning when multimedia was presented with its components.

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