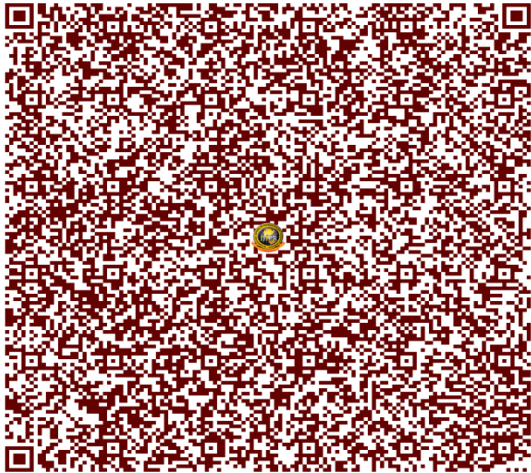


Effectiveness of Multi Media Teaching on Achievement of VIII Standard Students in Biology**Dr. C.V. Satyaprakasha¹, Sunitha Behera²**¹Associate ProfessorDepartment of Post Graduate Studies in Education
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Bangalore - 560025, Karnataka**Abstract**

Multimedia can be relevant in teaching various school subjects including biology. In the present study attempt has been made to find out the effect of multimedia teaching on achievement in biology. Objectives of the study were to find out the effectiveness of multimedia teaching on achievement in biology. Also, to find out the effectiveness of multimedia teaching on achievement in biology of students belonging to different intellectual levels of experimental group in biology. Based on objectives, two hypotheses have been formulated for empirical validation. In this study, pretest-posttest equivalent group design was used to evaluate the relative effectiveness of multimedia teaching with respect to conventional method of teaching in biology. The sample consisted of 80 students of class VIII with a mean age of 13 years studying in an unaided school at Bangalore, Karnataka. Cluster and random sampling techniques were adopted for the collection of data. Tools used were 1) Achievement Test in Biology developed by the investigator and 2) Ravan's Progressive Matrices Test. Statistical techniques used were t-test, ANOVA. Major Findings of the study were 1) multimedia teaching significantly enhanced the achievement with respect to knowledge, understanding and application and total achievement in biology as compared to conventional method, 2) there was no significant difference in achievement among the students of different intellectual level in biology. This implies that multimedia teaching equally promoted achievement in biology among the students of different intellectual levels in the experimental group.

Key Words: Multimedia Teaching, Biology Achievement, Educational Implications, Intellectual Levels, Experimental Group**PAPER ID: IJIFR / V1 / E8 / 027**



1 Introduction

Science is the knowledge attained through study or practice or knowledge covering general truths of the operation of general laws, especially as obtained and tested through scientific method concerned with the physical world. Science refers to a system of acquiring knowledge. This system uses observation and experimentation to describe and explain natural phenomena. Biology is a natural science concerned with the study of life and living organisms, including their structure, function, growth, origin, evolution, distribution, and taxonomy. Biology is a vast subject containing many subdivisions, topics, and disciplines. The objectives of teaching biological science in the secondary school level are to familiarize to pupil with the world in which he lives and to make him understand the impact of it on society so as to enable him adjust himself to his environment, acquaint him with the scientific method and to enable him to develop the scientific attitude, and achievement motivation, give the pupil a historical perspective, so that he may understand the evolution of the scientific development, develop skills in handling and manipulating apparatus, arranging science fairs, and exhibitions, preparing handmade apparatus, drawing and painting etc., develop abilities involved in problem-solving, improvising, and organizing. Methodology used in science teaching can be classified into two types: teacher-centered methods which include lecture, lecture-demonstration, historical and pupil centered methods which include heuristic, assignment, project and discussion. These methods no longer attract the attention of the present day students. The most common methods of teaching science in schools even to this day are lecture and lecture-cum-demonstration method. Both these methods stresses upon naming, memorizing and recalling information. These methods may make the learner to be passive in the learning process. Learning is to effect desirable changes in behavior, in our habits, style of living and adjustment of knowledge, skills etc. Traditional methods may reduce the achievement of students, limit ones interest to investigate and decline the spirit of inquiry. In such classrooms students are unhappy, disinterested and unsatisfied. . Due to a vast expansion of scientific knowledge and technology a teacher has to equip herself with various efficient methods to make her classroom interesting and teaching effective. Thus the investigator has taken up the use of multimedia in teaching. Multimedia is a term frequently heard and discussed among educational technologists today. Unless clearly defined, the term can alternately mean .a judicious mix of various mass media such as print, audio and video or it may mean the development of computer-based hardware and software packages produced on a mass scale and yet allow individualized use and learning. In essence, multimedia merges multiple levels of learning into an educational tool that allows for diversity in curricula presentation. Multimedia is the exciting combination of computer hardware and software that allows us to integrate video, animation, audio, graphics, and test resources to develop effective presentations on an affordable desktop computer.

2 Concept of Multi Media

As the term suggests, multi media is a combination of various media. It is use of more than one medium, i.e. audio, video, graphics, animations and text, within a single desktop computer programme. In other words, multimedia means the processing and presentation of two or more media. Though multimedia is a combination of two or more media, it is not just mixing of these media. Vaughan (1996)

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uses the term 'woven combination' in the context of multimedia. According to Ravet and Layte (1997) the quality of a multimedia package depends on what is combination and how those are combined. The critical factor would be the way in which the media are made to work together to create an 'elaborated whole. Multimedia can mean any kind of file or document, either a text or spreadsheet that have audio / video effects or "an interactive information cafe". Multimedia uses computers to present text, audio, video, animation, interactive features, and still images in various ways and combinations made possible through the advancement of technology. By combining media and content, those interested in multimedia can take on and work with a variety of media forms to get their content across. This is an exciting new field for those interested in computers, technology, and creative career options. Multimedia can be accessed through computers or electronic devices and integrates the various forms together. One example of multimedia would be combining a website with video, audio, or text images.

3 Advantages of Multi Media

How multimedia helps children in the classroom? Multimedia can be used for drill and practice, to master basic skills, development of writing skills, problem solving, understanding abstract science concepts, simulation in science, manipulation of data, acquisition of computer skills for general purposes, business and vocational training, access and communication to understand populations, students access for teachers and students in remote locations individualized and cooperative learning, management and administration of classroom activities, to take into account different learning styles, to allows self pacing and development. It provides the students the flexibility of anywhere and anytime learning. Multimedia can bridge language barriers as audio is not the only means of communications. It has been proven by research that multimedia in schools are effective for students to learn both 'from' and 'with' it. The focus is now on media and technology because of their advantages in terms of repeatability and equity of access. Multimedia helps students to construct knowledge actively, work in groups and use multi-senses at a time.

Multimedia is characterized by the presence of text, pictures, sound, animation and video; some or all of which are organized into some coherent program. (Phillips,1997). Today's multimedia is a carefully woven combination of text, graphic art, sound, animation, and video elements. When you allow an end user, i.e. the viewer of a multimedia project, to control 'what' and 'when' and 'how' of the elements that are delivered and presented, it becomes interactive multimedia. As such multimedia can be defined as an integration of multiple media elements (audio, video, graphics, text, animation etc.) into one synergetic and symbiotic whole that results in more benefits for the end user than any one of the media element can provide individually. The growth of information and communication technology (ICT) in society is reflected in policies to encourage the use of ICT in education and the development of educational multimedia. Government policy on the National Grid for Learning is driving the uptake and use of multimedia and internet in schools. The use of CD-ROM and the internet is becoming an integral part of the curriculum in all areas. The introduction of multimedia into the classroom has a profound impact on teachers' role and on students' learning and motivation. Weidong Xhang (2003) says that multimedia is a hot topic in education because it represents the latest technology and introduces into the classroom whole



new ways of thinking about curriculum, interactions with students and even the nature of learning itself. He elaborates that the meaning of multimedia has changed from meaning nothing to everything. Multimedia can mean any kind of file or document, either a text or spreadsheet that have audio / video effects or "an interactive information cafe". Whatever it is not, it certainly is the most promising technology in education. Jagannath Mohanty (2008), in his study on the multimedia approach to learning, stated that, a variety of resources, starting from the traditional media to the Internet, are now accessible, the author says that teachers have to use their imagination, ingenuity and initiative, if this storehouse of multimedia is to be taken advantage of in the teaching learning process. He states, that multimedia has been popular in this age of Science and Technology. It means an integration of sound, still Images, animation, video and text along with computing technology. It helps learning, browsing through encyclopedia and reference materials starting from the circulatory system to an automatic explosion in commercial presentation, official exposition, and in creating 3D effects in many ways. It also helps learners in mastering various languages.

In order to make education meaningful, exciting, interesting and accessible to all, a new technology needs to be linked with the process of learning. The new technology is not only capable of overcoming the barriers that distance presents, but also changes the very nature of the instructional process. Modern communication technologies have the potential to bypass several stages and sequences in the process of development encountered in early decades. Modern educational technologies must reach the most distant areas and benefit the most deprived sections of beneficiaries. Simultaneously, in order to avoid structural dualism, web technology is the only technology that serves all the above purposes at less cost. Distance educators can use web to build classroom home page. The web provides a new opportunity for distance teaching and learning.

4 Educational Implications/Advantages/Use of Multimedia

Multimedia enables students to represent information using several different media. Hypermedia links allow students to organise information in meaningful ways, can take into account different learning styles - some students learn by interpreting text, while others require more graphical or aural representations, allows for self-pacing and discovery. Students can take the time they need and choose the path of learning, making learning meaningful and pleasurable, helps in development of higher order thinking skills. Interactive multimedia encourages students to seek information, apply knowledge and re-attempt tasks (based on feedback given), behaviours that are associated with higher order learning, provides the students the flexibility of 'anywhere', 'any time' learning, helps in developing group and interpersonal skills. Better communication between students via e-mail, chat sessions etc., can encourage collaborative learning and enhance student/teacher interactions, can bridge language barriers since audio is not the only means of communications, and helps students to learn the content in a given discipline. It helps students to think effectively, practice problem solving and decision making. It has been proved by research that multimedia in schools are effective for students to learn both 'from' and 'will' it. The focus is now on media and technology because of their advantages in terms of repeatability, transportability and equity of access. Multimedia helps students to construct knowledge actively, work in



groups and use multi-senses at a time. Student's exposure to such technologies will result in better teaching-learning as compared to traditional method and it also equips them in using the same in their future. It will help the students to accept the fast. To improve upon the quality of information presented various techniques are to be implemented and growing changes in the field of science and technology, multimedia merges multiple levels of learning into an educational tool that allows for diversity in curricula presentation.

Review of related literatures revealed that studies have been taken up by the researchers in India and abroad, at different levels of education to find out the effect of multimedia teaching on several measures in different subject areas like Mathematics (Nirmala et.al.,2006; Yea-Ru Chang, 1999), Science (Rulon, Vellaisamy, 2007), Writing Competence (Sangeeta, 2005), Environmental Science (Maya, 2011), Geography (Girija N Srinivaslu, 2011), Economics (Tholappa and Krishnakumar, 2011), Biology (Vanitha, 2002;Angadi, 2011), Physics (Shirley Pasion Caday, 2004), Biology (Yashpal Sudhanshu, 2014), Accountancy (Babu, 2008) etc. Researchers have also reported their findings based on gender of the students (Girija N srinivaslu,2011), (Angadi ,2011) and (Babu, 2008). These studies showed the positive effect of of multimedia teaching on achievement and various other measures. But its effectiveness on achievement in biology and to what extent multimedia teaching contributes for the achievement of students of different intellectual levels is rarely reported. Hence keeping in mind the importance of using multimedia approach in classroom instruction and also the need for research in this field calls for the research in this field. Therefore, the present study aims to find out the effectiveness of multimedia in teaching on achievement in biology.

5 The Problem

Effectiveness of Multimedia Teaching on Achievement in Biology

6 Objectives of the Study

1. To find out the effectiveness of multimedia teaching on achievement in biology
2. To find out the effectiveness of multimedia teaching on achievement of students belonging to different intellectual levels of experimental group in biology

7 Research Methodology

7.1 Hypotheses of the Study

1. There is no significant difference between achievement of experimental and control group in biology
2. There is no significant difference between achievement of students belonging to different intellectual levels of experimental group in biology

7.2 Variables of the Study

- 1) **Independent-** Multi Media Teaching was the independent variable.
- 2) **Dependent-** Achievement in biology was the dependent variables.



7.3 Research Design

In this study, pretest-posttest equivalent group design was used to evaluate the relative effectiveness of multimedia teaching with respect to conventional method of teaching in biology. Two groups of students of class VIII were selected for the study and were considered as experimental and control group respectively. Experimental group was exposed to multimedia teaching and the control group was taught by conventional method of teaching. The effect of multimedia teaching and conventional method of teaching on the respective group was assessed with the help of pretesting and post testing on achievement in biology. Both the groups were compared by calculating the gain scores in achievement test in Biology.

7.4 Sample of the Study

The sample of the study consisted of 80 students of class VIII with a mean age of 13years studying in an unaided school at Bangalore, Karnataka. Cluster and random sampling techniques were adopted for the collection of data. Achievement Test in Biology and Raven's Progressive Matrices test were administered to all the students of class VIII. The students were matched by pairing their scores obtained in the test of achievement in biology and Raven's Progressive Matrices. Finally, 40 pairs of students were selected for the experiment. Out of these 40 pairs, 40 students were treated as experimental group and remaining 40 students were considered as control group. Both the groups had no previous experiences of multimedia teaching in their classes/schools.

7.5 Tools and techniques used in the study

- 1) Achievement Test in Biology developed by the investigator.
- 2) Raven's Progressive Matrices Test (1938).

Before and after the transaction of the lessons, achievement test in biology was administered as pretest and posttest. The test was scored following their respective scoring procedure and the results of the experimental and control group were compared.

7.6 Statistical analysis

- 1) t-test was be used to determine the significance of difference in the means of achievement in biology.
- 2) To find out the effectiveness of multimedia teaching on achievement of the students belonging to different intelligence levels of experimental group in biology, ANOVA was used.

8 Analyses and Interpretation of Data

In order to test the objectives, two hypotheses have been framed. One of them has been tested for its significance by using appropriate statistical techniques i.e. mean, standard deviation and t- values which were computed for gain scores of experimental and control group for achievement in biology and

one way ANOVA was calculated to assess the attainment of achievement in biology of students belonging to different intellectual levels of experimental group.

8.1 Analysis of Gain in Achievement in Biology

Comparison of Gain Scores of Experimental group and Control group in Biology

Hypothesis-1: There is no significant difference between achievement of experimental and control group in biology.

For the purpose of testing the hypothesis stated above, gain scores of achievement in biology of experimental and control group were obtained by subtracting pretest scores from posttest scores. Mean, standard deviation and t-values were computed and are presented in table 1.

Table-1: Mean, Standard Deviation and t-values of Gain Scores of Experimental and Control Group in Achievement in Biology

Objectives	Experimental Group N=(40)		Control Group N=(40)		t-value
	Mean	Standard Deviation	Mean	Standard Deviation	
Knowledge	4.7000	3.91054	1.2500	1.56484	5.180**
Understanding	2.7750	2.71262	0.1250	1.58822	5.835**
Application	1.8000	2.36643	0.4500	1.29990	3.162**
Total	9.2750	6.87615	1.5750	1.97273	6.808**

****Significant at 0.01 level**

Table 1 shows that the obtained t-values for Knowledge (t = 5.810), Understanding (t = 5.835), Application (t = 3.162) and Total achievement (t = 6.808) are greater than the table t-value 2.64 i.e., for 78 degrees of freedom at 0.01 level of significance. From this, it is clear that there is a significant difference between the mean gain scores of experimental and control group in achievement in biology. Hence, the hypothesis is rejected and an alternative hypothesis that there is a significant difference between achievement of experimental and control group in biology has been formulated. The result shows a high degree of effectiveness of multimedia teaching in fostering student's achievement in biology with respect to conventional method of teaching. From the table it also becomes clear that the mean for knowledge (M=4.7000), understanding (M= 2.7750), application (M=1.8000) and total (M=9.2750) of experimental group are found higher than of mean for knowledge (M= 1.2500), understanding (M = 0.1250), application (M = 0.4500) and total (M =1.5750) of control group. This clearly indicates that multimedia teaching has contributed for achievement of experimental group in biology than conventional method of teaching. The result obtained may be due to the continuous exposure of experimental group to multimedia teaching. In multimedia teaching set up, maximum freedom was given to the students to gather information by surfing the internet and watching the various YouTube videos. The self made

power-point presentations and Audio-visual presentations enable them to recall, recognize, identify, explain the concept, give examples, generalize the ideas and infer etc. Students were allowed to draw the diagrams on the smart board using magnetic pen. These activities boosted their confidence in drawing skills.

They were allowed to discuss and interact closely with teacher and the fellow students to gather more information and clarify any doubts regarding the concept. Recapitulation of the taught lesson was followed after every class through various activities and quiz questions. The learning environment was

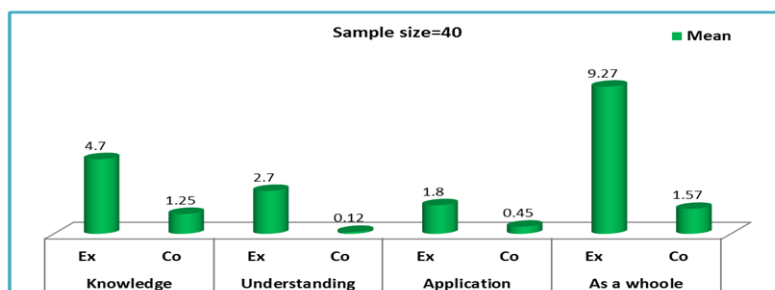


Figure 1 Graph showing the difference in Mean Gain Scores in Achievement in Biology with respect to Knowledge, Understanding, Application and Total Scores of Experimental and Control Group

friendly, interesting and encouraging. Students participated in teaching-learning process with much enthusiasm and curiosity whereas; in case of control group students had learnt only through lecture method without being exposed to multimedia. Students were passive listeners and recipients of knowledge imparted by the teacher. There was no scope for the development of higher order of thinking. Generally in conventional method of teaching less number of multimedia materials are used. Classroom environment is rigid and monotonous as compared to the multimedia teaching setup. The above discussed situations of multimedia teaching could be attributed for the increase in the acquisition of both lower and higher order objectives and total achievement in biology.

Hypothesis 2: There is no significant difference between achievements of students belonging to different intellectual levels of experimental group in biology. Mean standard deviation and t-values were computed and are presented in table 2.

Table 2: N, Standard Deviation and F-value of Scores of Students Belonging to High, Moderate and Low Levels of Intelligence of Experimental Group in Achievement in Biology

Levels of intelligence	N	Mean	S. D.	Total Achievement	Sum of Squares	df	Mean Square	F-value
High	7	8.4286	6.90066	Between Groups	18.217	2	9.108	0.832
Moderate	26	9.7692	7.02172	Within Groups	1825.758	37	49.345	
Low	7	8.2857	7.15808	Total	1843.975	39		
Total	40	9.2750	6.87615					

The obtained F-value for students belonging to high, moderate, low intelligence groups and total scores of achievement in biology is 0.832. This value is lesser than the table F-value 3.13 for 2, 37 degrees of freedom at 0.05 level of significance. This indicates that there is no significant difference in the attainment of achievement in biology among the students belonging to different intellectual level groups. From this it can be inferred that the students, irrespective of the intelligence groups to which they belonged to, were benefitted by multimedia teaching equally. Hence, it can be concluded that multimedia teaching, if properly implemented, contributes for the attainment of achievement in biology among the students of different intellectual levels.

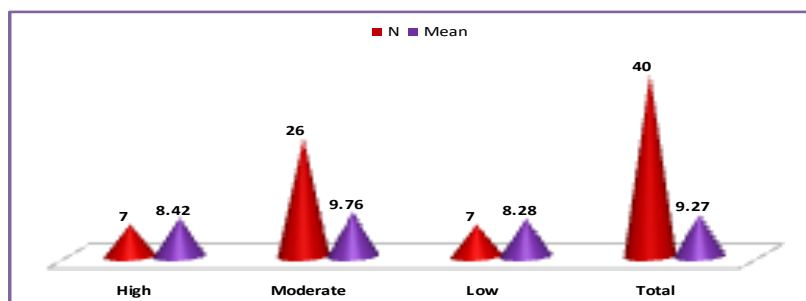


Fig 5: N and Mean Gain Scores of Students of Different levels of intelligence on achievement scores



9 Major Findings of the Study

- 1) Multimedia teaching significantly enhanced the achievement with respect to knowledge, understanding and application and total achievement in biology as compared to conventional method,
- 2) There was no significant difference in achievement among the students belonging to different intellectual levels of experimental group in biology. This implied that multimedia teaching equally promoted achievement in biology among the students belonging to different intellectual levels of experimental group in biology.

10 Educational Implications

The positive result obtained by the experimental group on the effectiveness of multimedia on achievement in biology at the high school level. This result leads to the following implications:

- For effective teaching, the teacher should acquire mastery on the content as well as expertise and adaptability of using multimedia devices in the classroom. In this direction teachers should be oriented about multimedia teaching, preparation of multimedia package in their own different subject content after using modern technology. Hence, pre-service and in-service teacher training programmes have to be organized to develop the skill of using modern technology in classroom teaching. Appropriate software, new technologies and modern Audio-visual aids like multimedia should be used to make the learning process effective as well as interesting.

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