

# A STUDY ON EFFECTIVENESS OF MULTIMEDIA FOR TEACHING BIOLOGY AT HIGHER SECONDARY SCHOOL LEVEL

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**Abstract:** Biology or Biological science is a branch of science that studies living organisms. The main aim of the present study is to achieve a comparative analysis as to which method is effective in Biology teaching the traditional method i.e. using Blackboard or multimedia method i.e. using PowerPoint Slides, Printed transparencies on OHP, etc. In the present research study the control group was taught certain topics of biology using the traditional chalk and blackboard, whereas, the same topics of biology were taught to the experimental students by using multimedia PowerPoint presentation. In the pretest of the control group, the value of mean, median and mode are 6.56, 7.5 and 9 respectively. In the pretest of the experimental group, the value of mean, median and mode are 6.26, 5.5 and 4 respectively. In the posttest of the control group, the value of mean, median and mode are 16.5, 16.5 and 14 respectively. In the posttest of the experimental group, the value of mean, median and mode are 23, 23 and 21 respectively. The unpaired “t” test analysis showed that there was no significant difference in the pretest achievement scores of experimental and control group in certain topics in biology. While significant difference in the posttest achievement scores of experimental and control group in certain topics in biology. Researcher has observed mark improvement in achievement test scores in experimental group student’s rather than control group students. Multimedia teaching and learning has contributed positively and enhancement of learning is being observed in the experimental group students.

**Index Terms - Biology, Multimedia, Unpaired ‘t’ test, Chalk and Board, HSC, Achievement test.**

## INTRODUCTION

Biology or Biological science is a branch of science that studies living organisms. Biological science encompasses many subjects such as Botany (Study of plants), Zoology (Study of animals), Microbiology (Study of microorganisms), Biotechnology (Application of technology in Biological sciences) and Genetics (Study of heredity and variations). (C. L. Garg, 2010)

Biology is one of the important subjects along with Physics, Chemistry and Mathematics at the Higher Secondary School level (H.S.C.) of any state, central or international board. Student desirable of pursuing further education in medical, paramedical or allied health science field has to successfully clear biology subject at the Higher Secondary School level examination. A complete understanding of various topics in Biology at H.S.C. level is very important as they have to implement the same while appearing for Common Entrance Test for securing admission into medical, paramedical or allied health courses.

Biological science is very vast field and the subject comprises of long textual concept including explanation of various Life processes, Life cycles, Biochemical pathways, Physiological cycles etc. The taxonomical terms in Biological sciences includes long words which are sometimes really difficult to memorize for vernacular medium students pursuing H.S.C. in science. Complicated diagrams are a part and parcel of Biology subject.

In many colleges across the country still the traditional method is being implemented while teaching the biology subject. The traditional method is giving explanation using the chalk and board. While teaching the biology subject the diagram is drawn on the board which the students is made to copy and the explanation is being given. Similarly while explaining any process the main points associated with the Biological process is being written on the board and explained to the students.

As the teaching proceeds students tend to lose interest in the topic as they cannot grasp the different parts of black and white diagram drawn on the board also they cannot understand the flow of the Biological process in detail. As they tend to lose interest they cannot explain the topic well if questioned in the examination. This virtually effect their marks and grades. Today explanation on any topic can be made interesting and easily understandable using the various multimedia gadgets and softwares such as OHP, LCD Projector, PowerPoint presentations, Video clips etc.

Usage of Multimedia is highly advantageous because multimedia increases the grasp of any topic, reduces the time for understanding, presentation of any topic becomes multi coloured and introduces possibility of detailed and easily explanations.

Such studies have been carried out earlier by many researchers in various subjects. Ravindranath (1982) in his study on development of multimedia instructional strategy for teaching science at secondary school level noted that the strategy was

effective to the extent that 70 percent of the experimental group students obtained 60 percent and above on all unit tests. Greenberg (1984) compared the effectiveness of computer assisted videocassette lessons with that of videocassette lessons and paper- pencil practice. The findings revealed that there was no significant difference existed between the post-test performances of the two groups. Sinnathambi (1991) developed a video program on energetics in chemistry for higher secondary students. He conclude that the performance of experimental groups were superior to the control group. Burton (1995) experienced the effectiveness of Computer Assisted Instruction over traditional instruction on academic performance of adult students in Mathematics and reading sections of the Test of Adult Basic Education. Age and sex had no effect on the method of instruction. But none of them have touched the research pertaining to the advantages and effectiveness of multimedia in Biology subjects especially for H.S.C students. So the present research study is highly significant.

The main aim of the present study is to achieve a comparative analysis as to which method is effective in Biology teaching the traditional method i.e. using Blackboard or multimedia method i.e. using PowerPoint Slides, Printed transparencies on OHP, etc.

## MATERIAL AND METHODS

### a) Target population

The Target population was 12<sup>th</sup> standard (HSC) students from different colleges of Mumbai district. Purposive sampling technique was employed to select the sample. The sample size was around 60 – 70 students which were divided in control and experimental groups.

### b) Data Collection

- All the students of both the groups were subjected to pretest. The pretest was assessed and the scores were recorded.
- The control group students were taught the topics in biology, Structure of Nephron and Physiology of Urine Formation by traditional method.
- And the experimental group students were taught the same topics but by using the multimedia.
- All the students of both the groups were then subjected to Achievement test. The Achievement test was assessed and the scores were recorded.
- The scores of the pretest and Achievement test were used as Quantitative data.
- This data was implemented in Unpaired ‘t’ test and the testing of the hypothesis was done.

## RESULTS AND DISCUSSIONS

Table 1: Descriptive analysis of Pretest scores of control group in Biology achievement test.

Group Control	N	Mean	Median	Mode	S.D.	Kurtosis	Skewness
Pretest achievement test	30	6.56	7.5	9	4.48	2.97	0.42

Table 2: Descriptive analysis of Pretest scores of experimental group in Biology achievement test.

Group Experimental	N	Mean	Median	Mode	S.D.	Kurtosis	Skewness
Pretest achievement test	30	6.26	5.5	4	3.47	1.71	0.12

Table 3: Descriptive analysis of Posttest scores of control group in Biology achievement test.

Group Control	N	Mean	Median	Mode	S.D.	Kurtosis	Skewness
Posttest achievement test	30	16.5	16.5	14	5.24	2.16	0.13

Table 4: Descriptive analysis of Posttest scores of experimental group in Biology achievement test.

Group Experimental	N	Mean	Median	Mode	S.D.	Kurtosis	Skewness

Posttest achievement test	30	23	23	21	4.24	2.34	- 0.34
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## 1) Testing of Hypotheses 1.

Objective: To ascertain the pretest scores of experimental and control group regarding effectiveness of multimedia for teaching biology.

H<sub>0</sub>1: There will be no significant difference in the pretest achievement scores of experimental and control group in certain topics in biology.

Table 5: Significance difference between the means of pretest score of control and experimental group in effectiveness of multimedia.

Group	Sample	Mean	SD	Df	Calculated t value	Table value		Los	
						0.05	0.01	0.05	0.01
Control	30	6.56	4.48	58	0.29	2.00	2.66	NS	NS
Experimental	30	6.26	3.47						

\*Los: Levels of significance

\*NS: Not significant

\*S: Significant

Interpretation: From the table, it could be seen that obtained value of t is 0.29 which is less than the table value of 0.05 level and 0.01 level. Hence the null hypothesis is not rejected.

Conclusion: There is no significant difference in the pretest achievement scores of experimental and control group in certain topics in biology.

## 2) Testing of Hypotheses 2.

Objective: To ascertain the posttest scores of experimental and control group regarding effectiveness of multimedia for teaching biology.

H<sub>0</sub>1: There will be no significant difference in the posttest achievement scores of experimental and control group in certain topics in biology.

Table 6: Significance difference between the means of posttest score of control and experimental group in effectiveness of multimedia.

Group	Sample	Mean	SD	Df	Calculated t value	Table value		Los	
						0.05	0.01	0.05	0.01
Control	30	16.5	5.24	58	5.27	2.00	2.66	S	S
Experimental	30	23	4.24						

\*Los: Levels of significance

\*NS: Not significant

\*S: Significant

Interpretation: From the table, it could be seen that obtained value of  $t$  is 5.27 which is more than the table value of 0.05 level and 0.01 level. Hence the null hypothesis is rejected.

Conclusion: There is significant difference in the posttest achievement scores of experimental and control group in certain topics in biology.

## CONCLUSION

In the pretest of the control group, the value of mean, median and mode are 6.56, 7.5 and 9 respectively. The difference between mean, median and mode is marginal and hence the distribution is near normal. The skewness of the distribution is 0.42 i.e. the distribution is slightly positively skewed. The kurtosis of the distribution is 2.97 which is above 0; hence the distribution curve of pretest scores of the control group is leptokurtic.

In the pretest of the experimental group, the value of mean, median and mode are 6.26, 5.5 and 4 respectively. The difference between mean, median and mode is marginal and hence the distribution is near normal. The skewness of the distribution is 0.12 i.e. the distribution is slightly positively skewed. The kurtosis of the distribution is 1.71 which is above 0; hence the distribution curve of pretest scores of the experimental group is leptokurtic.

In the posttest of the control group, the value of mean, median and mode are 16.5, 16.5 and 14 respectively. The difference between mean, median and mode is marginal and hence the distribution is near normal. The skewness of the distribution is 0.13 i.e. the distribution is slightly positively skewed. The kurtosis of the distribution is 2.16 which is above 0; hence the distribution curve of posttest scores of the control group is leptokurtic.

In the posttest of the experimental group, the value of mean, median and mode are 23, 23 and 21 respectively. The difference between mean, median and mode is marginal and hence the distribution is near normal. The skewness of the distribution is -0.34 i.e. the distribution is slightly negatively skewed. The kurtosis of the distribution is 2.34 which is above 0; hence the distribution curve of posttest scores of the experimental group is leptokurtic.

In the present research study the control group was taught certain topics of biology using the traditional chalk and blackboard, whereas, the same topics of biology were taught to the experimental students by using multimedia PowerPoint presentation. In the control group it was observed that students couldn't grasp the topic quickly as the diagrams and explanation was monochromatic in nature. But the experimental group students were able to grasp the topic quickly and were also able to think critically and practically this was because of the multicolored multimedia PowerPoint presentations that were being used to teach the topics. Researcher has observed mark improvement in achievement test scores in experimental group student's rather than control group students. Multimedia teaching and learning has contributed positively and enhancement of learning is being observed in the experimental group students.

It is needless to stress on the fact that multimedia teaching is absolutely essential for teaching biology topics to ensure better and fast understanding and grasping of science concepts. The intervention showed a positive impact on the overall confidence of the students to understand biology topics. The usage of multimedia in biology teaching helped in sustaining the attention of students and provided a novel stimulus for teaching – learning to the students.

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