

## **EFFECT OF MULTIMEDIA APPROACH ON ACHIEVEMENT IN BIOLOGY OF IX GRADE STUDENTS IN RELATION TO THEIR LEARNING STYLES**

**Parul Aggarwal\***

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### **Abstract-**

The present research study has been intended to know the effect of multimedia approach on achievement in relation to their learning style. For this purpose, a sample of 80 students of IX grade of secondary schools affiliated to PSEB board were taken. Results had shown that the usage of approach had positive effects on achievement of students.

**Keywords:-** Achievement, Biology, Learning Styles, Multimedia Approach, Traditional Approach

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\* *Assistant Professor, Khalsa College of Education, Amritsar*

## 1. Introduction

*“The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn and relearn.”*

*-Alvin Toffler*

As the world becomes more complex, the skills that students need to acquire and master are quickly changing. The rise of global economy, multicultural society and rapid changes in technology require students to learn and apply new skills in their academic and career endeavours. Students need to learn to communicate more effectively both through speech and written words. They need to learn how to find new and better ways to solve problems and meet the challenges of everyday life. They need to develop skills they can use in school, college or work place. Perhaps most importantly, students need to discover the joy of learning. If students are to function effectively in their ever changing world, they must continue to learn every day in their lives.

Today in the midst of social and technological explosion in the various fields of knowledge as well as in the techniques by which this outbursting knowledge is communicated, the teacher can no longer be the sole and mere information giving instruments in the class room. Further, the growing school population and its concomitantly eager and more diverse variety of classes make it increasingly more difficult for a single teacher to “reach and child” with the information giving methods that we generally follow in the class room. These methods have failed to bring about effective learning and effective learning is brought about essentially by effective teaching.

Today, millions of learners all over the world belong to the next generation. These learners use computers and other digital media for entertaining, learning, communicating and shopping. This type of learning stresses the innovative approach such as multimedia.

Multimedia learning experiences represent a natural way for learning to take place. Learning pace can be accelerated by involving maximum number of senses. Sensory experiences form the foundation of intellectual activity within any formal school situation. Moreover, the learner differs in the effectiveness of their sense reception. Multimedia learning experiences have the advantage of appealing to the individual according to the learner’s pace, interest and readiness.

Besides this, cognition and conceptualization depend on a chain of events which begin with the learner’s perception of stimuli that may be auditory, visual and tactile. It is important that these initial learning experiences be accurate, dependable and understandable. Unless the learners initial sensory impressions are accurate, it is impossible for them to have reliable conceptualization and understanding. With the existing numerous kind of aids, carefully organized presentation of information, a variety of media should occupy the learner’s conscious attention to living stimuli.

Lot of new technologies are emerging in the field of teaching biology, with ongoing research in teaching biology through multimedia. Most of the teachers follow traditional approach in teaching biology. Material supplied is used to teach through traditional approach. Since the classes are crowded, they cannot capture the attention of the students. But according to NPE (1992), every effort will be made to extend science education to vast members who have remained outside the pole of formal education. So, interactive multimedia is one of the answers

to overcome this. Multimedia has been considered as a preferred medium in revolutionizing education because it is a combination of different elements, texts, graphics, animations, simulations and sounds. It is used to form an informative and interactive learning environment.

## **2. Objectives of the study**

1. To study the effect of multimedia approach on the achievement in biology of experimental group.
2. To compare the achievement in biology of students taught with multimedia approach and traditional approach.
3. To study the effect of multimedia approach on the achievement in biology of IX grade students in relation to their learning styles.

## **3. Hypotheses**

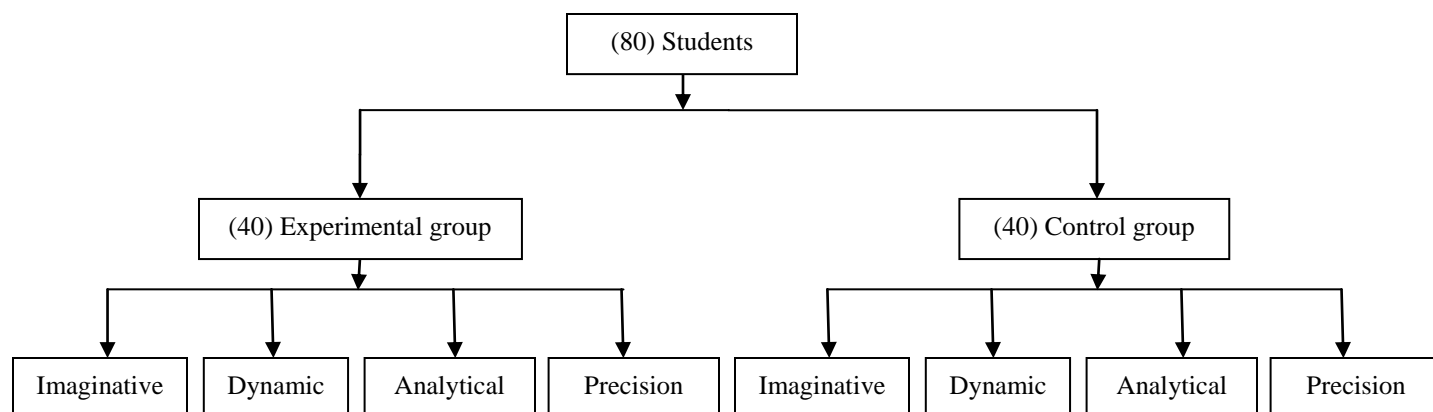
1. There is no significant difference in the mean achievement scores in biology at pre-test and post-test stages of experimental group.
2. There is no significant difference in the mean achievement scores in biology of experimental group and control group at post-test stage.
3. There is no significant effect of teaching techniques (multimedia vs traditional approach) in relation to their learning styles.
  - i. There is no significant difference in the achievement of students in biology taught through multimedia approach and traditional approach in relation to their Dynamic style of learning.
  - ii. There is no significant difference in the achievement of students in biology taught through multimedia approach and traditional approach in relation to their Analytical style of learning.
  - iii. There is no significant difference in the achievement of students in biology taught through multimedia approach and traditional approach in relation to their Imaginative style of learning.
  - iv. There is no significant difference in the achievement of students in biology taught through multimedia approach and traditional approach in relation to their Precision style of learning.

## **4. Research Design**

The present study falls in the domain of Experimental Research as it intends to study the effect of multimedia approach on achievement in biology of IX grade students in relation to their learning styles.

### **4.1 Sample**

The sample comprised of 80 students which was taken from schools affiliated to PSEB of Amritsar city.



**Fig. 1: Showing the total sample (N=80) of the study**

## 4.2 Tools

The following tools were employed for collecting data:

1. Group test of Intelligence by G.C. Ahuja (1990) to equate the groups.
2. Learning Styles Inventory by Ritu and Dadwal.
3. Multimedia package consisting of power point presentations using MS office 2007 for experimental group.
4. A self-constructed Achievement test in Biology. The Questionnaire contained the following topics for both pre-test and post-test.

**Table 1: Showing Topics of Biology for Self-Constructed Achievement Test**

S.No.	Name of the Topic	No. of Questions	Marks
1.	Structural unit of life	15	15
2.	Tissues	15	15
3.	Total	30	30

## 4.3 Procedure

The three stages involved in the present study are as follows:

### 4.3.1 Pre-test stage

This stage involved the administration of the following tests:

1. Group test of Intelligence by G.C. Ahuja to equate the groups.
2. A self-constructed pre-test of Biology.

To identify the achievement of students, both the tests were administered.

### Equating of groups

1. Dr. G.C. Ahuja's Group test of Intelligence was administered to equate the groups of IX grade students on the basis of intelligence test scores.
2. Intelligence test scores of IX grade students were equated on means and S.Ds. 't'-ratios were calculated to study the significance of difference between means and S.Ds of both groups. 't'-ratios were found to be insignificant as shown in Table 2 & Table 3.

**Table 2: Showing t-ratio equating the intelligence scores of both the groups on means**

Groups	Mean	S.D.	S.E <sub>D</sub>	Mean difference(D)	df	t-ratio	Remarks
Experimental	102.38	8.76	2.11	0.25	78	0.118	Insignificant at 0.05 level
Control	102.13	10.09					

**Table 3: Showing t-ratio equating the intelligence scores of both the groups on S.Ds**

Groups	S.D	S.E <sub>σ</sub>	S.D.difference(D)	Dσ	df	t-ratio	Remarks
Experimental	8.76	0.98	1.33	1.78	78	0.747	Insignificant at 0.05 level
Control	10.09	1.134					

The students of IX grade were given a self prepared Achievement Test in order to find out their previous knowledge on topics that were to be taught during the experiment. Similarly, the pre-test scores of IX grade students were equated on means and S.Ds. 't'-ratios were calculated and they were found to be insignificant as shown in Table 4 & Table 5.

**Table 4: Showing t-ratio equating the pre-test scores of both the groups on means**

Groups	Mean	S.D.	S.E <sub>D</sub>	Mean difference(D)	df	t-ratio	Remarks
Experimental	9.35	2.63	0.031	0.03	78	0.79	Insignificant at 0.05 level
Control	9.38	2.624					

**Table 5: Showing t-ratio equating the pre-test scores of both the groups on S.Ds**

Groups	S.D	S.E <sub>σ</sub>	S.D.difference(D)	Dσ	df	t-ratio	Remarks
Experimental	2.63	0.295	0.014	0.49	78	0.012	Insignificant at 0.05 level
Control	2.624	0.294					

Finally, when it was found that groups didnot differ significantly on their intelligence and pre-test scores, the groups were named as Experimental group and Control group with the flip of a coin.

A= Experimental group

B=Control group

**Table 6: Showing Group Wise Distribution of the sample**

Group	No. of Students
Experimental	A(40)
Control	B(40)

Hypothesis wise analysis and interpretation of data is given ahead.

#### 4.3.2 Treatment/Intervention

After equating both the groups on the basis of intelligence scores and pre-test scores, actual teaching was undertaken. One period for each group was taken daily. Experimental group was taught in the morning and control group in the afternoon on the first day. On the second day, control group was taught in the afternoon. Same procedure was adopted throughout the whole experiment. All the topics were taught in the same sequence to experimental as well as control group. Whole teaching process was carried out for 18 days excluding Sundays and other holidays.

**Table 7: Showing time and duration of teaching both the groups on different days**

DAYS	GROUPS	
	Experimental (A)	Control(B)
Ist	Morning (9:00 to 9:40)	Afternoon (12:00 to 12:40)
IInd	Afternoon (12:00 to 12:40)	Morning (9:00 to 9:40)

#### 4.3.2 Post-test

To find out the achievement of experimental and control group after teaching with the help of multimedia presentations (i.e. power point presentations) and traditional approach respectively, the post-test was administered.

#### 4.4 Analysis and Interpretation of Data

##### Hypothesis-I

First hypothesis was framed to examine the significant difference in the achievement scores of pre-test and post-test of experimental group.

The hypothesis is “There is no significant difference in the mean achievement scores in biology at pre-test and post-test stages of experimental group”.

In order to test the hypothesis, raw scores of students in pre-test and post-test were analysed. The mean gain scores and S.Ds were calculated to test the hypothesis. This hypothesis was further examined by applying t-test of significance. The result of this analysis has been reported in Table 8.

**Table 8: Showing t-ratio depicting the difference in mean achievement scores of pre-test and post-test of experimental group**

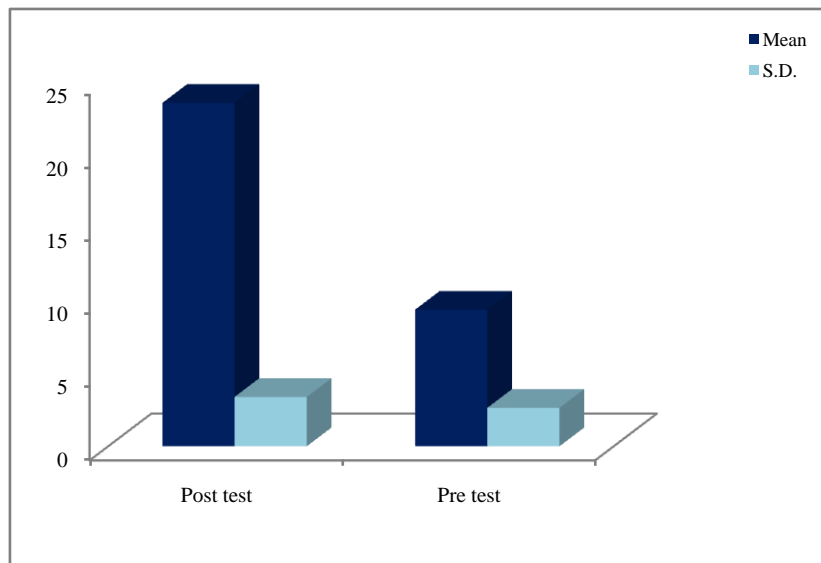
Test	N	Mean	S.D.	S.E <sub>D</sub>	Mean difference(D)	df	t-ratio	Remarks
Pre-test	40	9.35	2.63	0.677	14.15	78	20.91	Significant at 0.01 level
Post-test	40	23.5	3.376					

Table 8 reveals that mean gain scores of pre-test and post-test were 9.35 and 23.5 with S.D 2.63 and 3.376 respectively. The mean difference (D) was 14.15. Further, ‘t’-ratio (t=20.91)

was highly significant at 0.01 level which clearly shows that mean gain scores of students of experimental group differs significantly at post-test stage.

Thus, this hypothesis namely “There is no significant difference in the mean achievement scores in biology at pre-test and post-test stages of experimental group” is not accepted.

The pictorial representation of the above data has been given in the Fig. 2.



**Figure 2: Difference in mean achievement scores of pre-test and post-test stages of experimental group**

### Hypothesis-II

Second hypothesis was framed to examine the significant difference in the mean achievement scores of experimental group and control group in biology.

The hypothesis is “There is no significant difference in the mean achievement scores in biology of experimental group and control group at post-test stage”.

In order to test the hypothesis, raw scores of students in pre-test and post-test were analysed. The mean gain scores and S.Ds were calculated to test the hypothesis. This hypothesis was further examined by applying t-test of significance. The result of this analysis has been reported in Table 9.

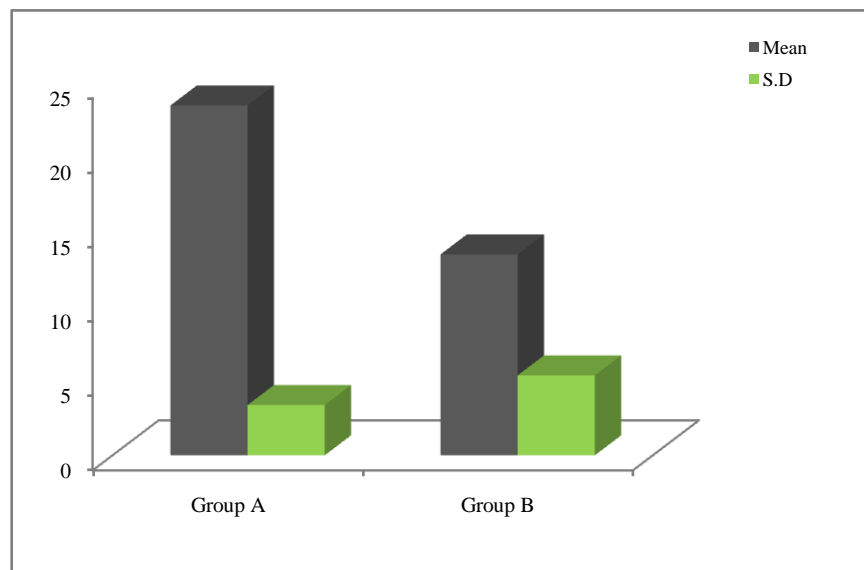
**Table 9: Showing t-ratio depicting the difference in mean achievement scores of experimental group and control group at post-test stage**

Group	N	Mean	S.D.	S.E <sub>D</sub>	Mean difference(D)	df	t-ratio	Remarks
Experimental	40	23.5	3.376	1.003	10	78	9.971	Significant at 0.01 level
Control	40	13.5	5.371					

Table 9 reveals that mean gain scores of experimental group (taught through multimedia approach) and control group (taught through traditional approach) were 23.5 and 13.5 with S.D 3.376 and 5.371 respectively. The mean difference (D) was 10. Further, ‘t’-ratio (t=9.971) was significant at 0.01 level which clearly shows that mean gain scores of students of experimental group were significantly higher than that of control group at post-test stage.

Thus, this hypothesis namely “There is no significant difference in the mean achievement scores in biology of experimental group and control group at post-test stage” is not accepted.

The pictorial representation of the above data has been given in the Fig. 3.



**Figure 3: Difference in mean achievement scores of experimental group and control group at post-test stage**

### Hypothesis-III (i)

This hypothesis was framed to examine the significant difference in the mean achievement scores of students having dynamic learning style of both the groups.

The hypothesis is “There is no significant difference in the achievement of students in biology taught through multimedia approach and traditional approach in relation to their Dynamic style of learning”.

In order to test the hypothesis, raw scores of students in pre-test and post-test were analysed. The mean gain scores and S.Ds were calculated to test the hypothesis. This hypothesis was further examined by applying t-test of significance. The result of this analysis has been reported in Table 10.

**Table 10: Showing t-ratio depicting the difference in mean achievement scores of learner of dynamic style of experimental group and control group at post-test stage**

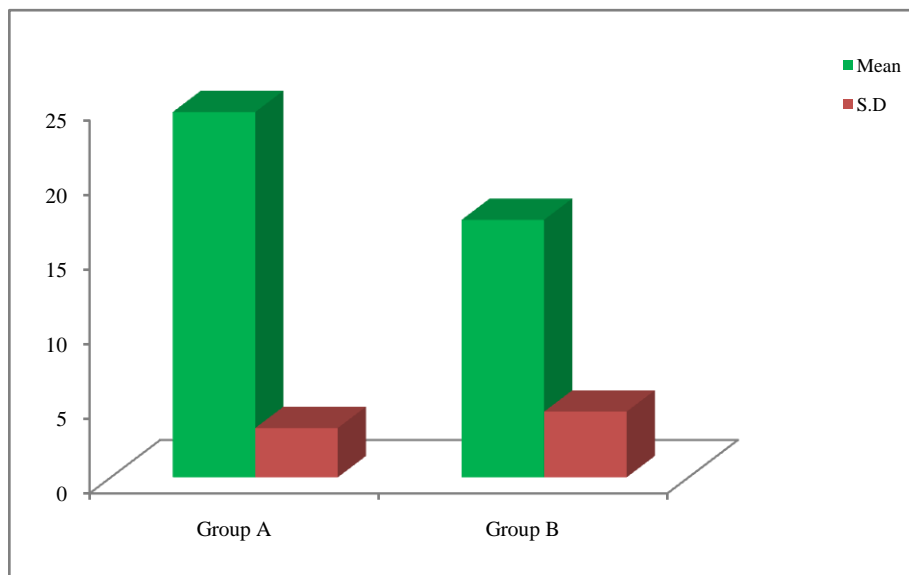
Group	N	Mean	S.D.	S.E <sub>D</sub>	Mean difference(D)	df	t-ratio	Remarks
Experimental	10	24.5	3.308	1.713	7.23	19	4.221	Significant at 0.01 level
Control	11	17.27	4.406					

Table 10 reveals that mean gain scores of students of dynamic style of experimental group (taught through multimedia approach) and control group (taught through traditional approach) were 24.5 and 17.27 with S.D 3.308 and 4.406 respectively. The mean difference (D) was 7.23. Further, ‘t’-ratio (t=4.221) was significant at 0.01 level which clearly shows that mean gain scores of students of dynamic style of experimental group were significantly higher than that of control group at post-test stage.



Thus, this hypothesis namely “There is no significant difference in the achievement of students in biology taught through multimedia approach and traditional approach in relation to their Dynamic style of learning” is not accepted.

The pictorial representation of the above data has been given in the Fig. 4.



**Figure 4: Difference in mean achievement scores of learner of dynamic style of experimental group and control group at post-test stage**

#### Hypothesis-III (ii)

This hypothesis was framed to examine the significant difference in the mean achievement scores of students having precision learning style of both the groups.

The hypothesis is “There is no significant difference in the achievement of students in biology taught through multimedia approach and traditional approach in relation to their Precision style of learning”.

In order to test the hypothesis, raw scores of students in pre-test and post-test were analysed. The mean gain scores and S.Ds were calculated to test the hypothesis. This hypothesis was further examined by applying t-test of significance. The result of this analysis has been reported in Table 11.

**Table 11: Showing t-ratio depicting the difference in mean achievement scores of learner of precision style of experimental group and control group at post-test stage**

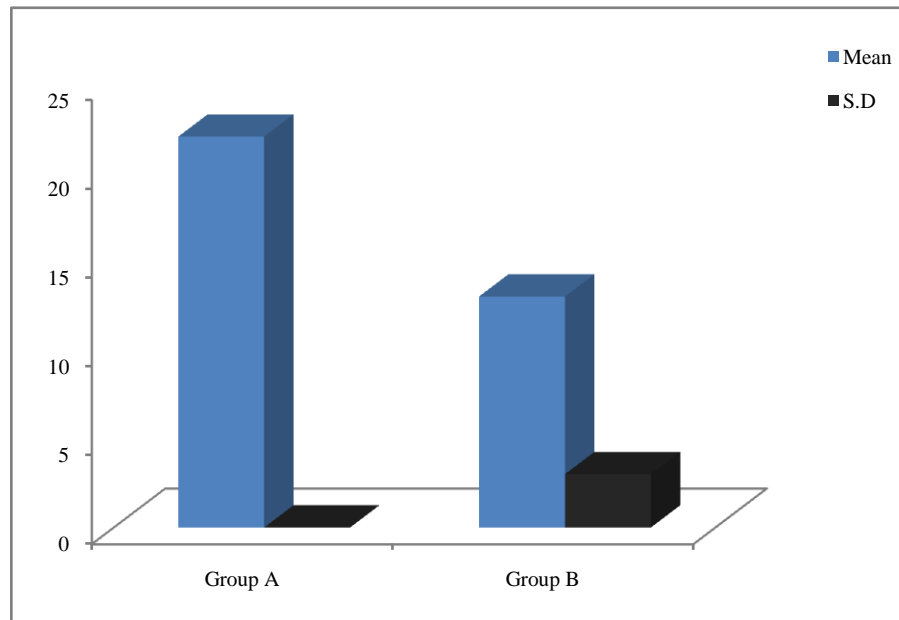
Group	N	Mean	S.D.	S.E <sub>D</sub>	Mean difference(D)	df	t-ratio	Remarks
Experimental	3	22	0	0.577	9	4	15.59	Significant at 0.01 level
Control	3	13	3					

Table 11 reveals that mean gain scores of students of precision style of experimental group (taught through multimedia approach) and control group (taught through traditional approach) were 22 and 13 with S.D 0 and 3 respectively. The mean difference (D) was 9. Further, ‘t’-ratio (t=15.59) was highly significant at 0.01 level which clearly shows that mean

gain scores of students of precision style of experimental group were significantly higher than that of control group at post-test stage.

Thus, this hypothesis namely “There is no significant difference in the achievement of students in biology taught through multimedia approach and traditional approach in relation to their Precision style of learning” is not accepted.

The pictorial representation of the above data has been given in the Fig. 5.



**Figure 5: Difference in mean achievement scores of learner of precision style of experimental group and control group at post-test stage**

### Hypothesis-III (iii)

This hypothesis was framed to examine the significant difference in the mean achievement scores of students having imaginative learning style of both the groups.

The hypothesis is “There is no significant difference in the achievement of students in biology taught through multimedia approach and traditional approach in relation to their Imaginative style of learning”.

In order to test the hypothesis, raw scores of students in pre-test and post-test were analysed. The mean gain scores and S.Ds were calculated to test the hypothesis. This hypothesis was further examined by applying t-test of significance. The result of this analysis has been reported in Table 12.

**Table 12: Showing t-ratio depicting the difference in mean achievement scores of learner of imaginative style of experimental group and control group at post-test stage**

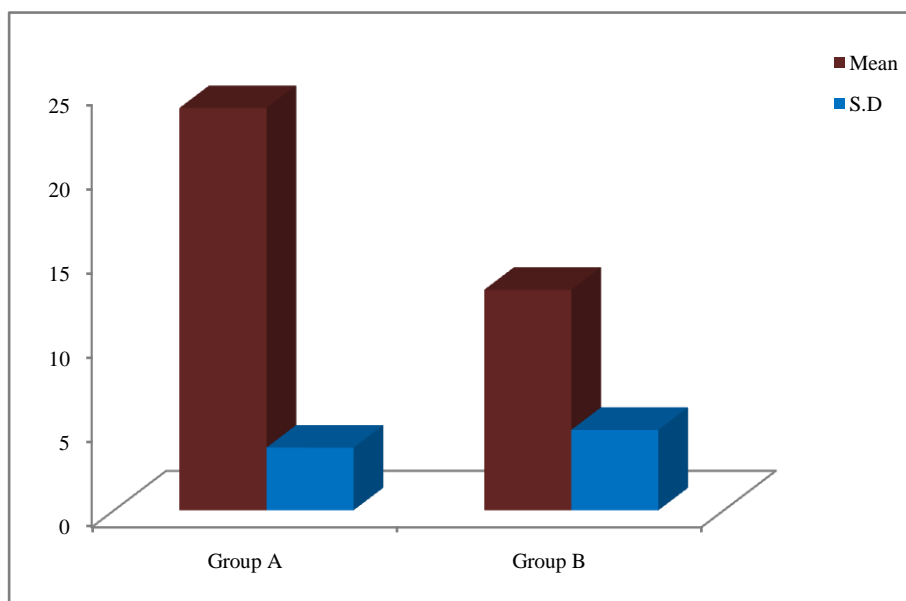
Group	N	Mean	S.D.	S.E <sub>D</sub>	Mean difference(D)	df	t-ratio	Remarks
Experimental	14	23.86	3.72	1.64	10.78	25	6.57	Significant at 0.01 level
Control	13	13.08	4.77					

Table 12 reveals that mean gain scores of students of imaginative style of experimental group (taught through multimedia approach) and control group (taught through traditional approach) were 23.86 and 13.08 with S.D 3.72 and 4.77 respectively. The mean difference (D)

was 10.78. Further, 't'-ratio ( $t=6.57$ ) was significant at 0.01 level which clearly shows that mean gain scores of students of imaginative style of experimental group were significantly higher than that of control group at post-test stage.

Thus, this hypothesis namely "There is no significant difference in the achievement of students in biology taught through multimedia approach and traditional approach in relation to their Imaginative style of learning" is not accepted.

The pictorial representation of the above data has been given in the Fig. 6.



**Figure 6: Difference in mean achievement scores of learner of imaginative style of experimental group and control group at post-test stage**

#### Hypothesis-III (iv)

This hypothesis was framed to examine the significant difference in the mean achievement scores of students having analytical learning style of both the groups.

The hypothesis is "There is no significant difference in the achievement of students in biology taught through multimedia approach and traditional approach in relation to their Analytical style of learning".

In order to test the hypothesis, raw scores of students in pre-test and post-test were analysed. The mean gain scores and S.Ds were calculated to test the hypothesis. This hypothesis was further examined by applying t-test of significance. The result of this analysis has been reported in Table 13.

**Table 13: Showing t-ratio depicting the difference in mean achievement scores of learner of analytical style of experimental group and control group at post-test stage**

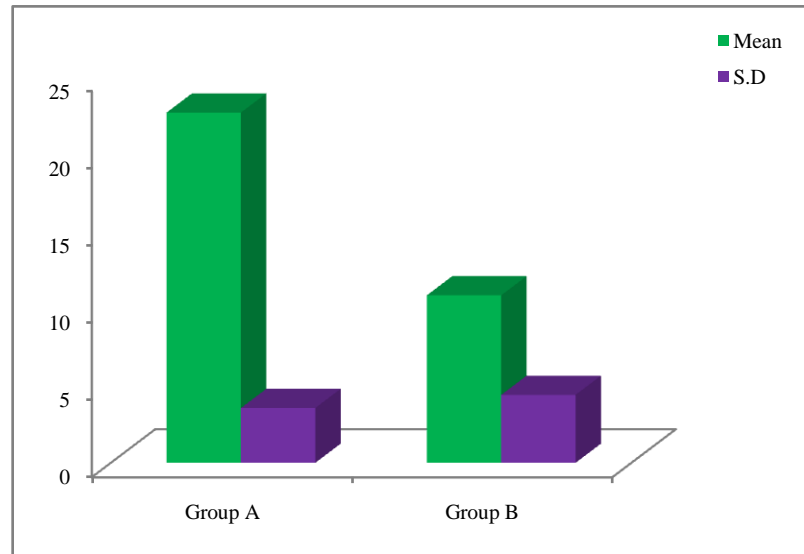
Group	N	Mean	S.D.	S.E <sub>D</sub>	Mean difference(D)	df	t-ratio	Remarks
Experimental	13	22.69	3.55	1.596	11.84	24	7.419	Significant at 0.01 level
Control	13	10.85	4.62					

Table 13 reveals that mean gain scores of students of analytical style of experimental group (taught through multimedia approach) and control group (taught through traditional

approach) were 22.69 and 10.85 with S.D 3.55 and 4.62 respectively. The mean difference (D) was 11.84. Further, 't'-ratio ( $t=7.419$ ) was significant at 0.01 level which clearly shows that mean gain scores of students of analytical style of experimental group were significantly higher than that of control group at post-test stage.

Thus, this hypothesis namely "There is no significant difference in the achievement of students in biology taught through multimedia approach and traditional approach in relation to their Analytical style of learning" is not accepted.

The pictorial representation of the above data has been given in the Fig. 7.



**Figure 7: Difference in mean achievement scores of learner of analytical style of experimental group and control group at post-test stage**

### Implications of the study

The positive effect of multimedia approach on achievement leads to the following educational implications:-

- In the present study, the multimedia approach was found far superior than the traditional approach of teaching in promoting the acquisition of both lower and higher order objectives i.e. knowledge, understanding and application. Hence, multimedia approach can be effectively implemented in secondary schools to attain different objectives of teaching biology.
- This approach can be effective for all the students with different learning abilities as individual differences can be overcome in learning through different media.
- On experimental basis, multimedia approach can be adopted in some schools for all the subjects to improve school effectiveness.
- This approach can be effective for all the students having different learning styles.

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