CHAPTER IV

ANALYSIS AND INTERPRETATION OF DATA

CHAPTER IV

ANALYSIS AND INTERPRETATION OF DATA.

4.1. Introduction :

For many educational research problems, the most appropriate data are those which may be collected by means of a test or other measuring instrument.

The investigator administered a ten marks test after every sub-unit and a forty marks comprehensive unit test after every unit. The experiment contained two units. The scores obtained were then collected and subjected to analysis and interpretation of data.

4.2. Analysis of Interpretation of Data obtained on Previous Test.

At the onset of the experiment, an objective test based on previous knowledge was administered to the subjects. This was done to select two equivalent groups for the experiment. The scores on the previous knowledge tests were treated statistically to judge the equivalency of the two groups i.e experimental group and control group.

Hypothesis 1 :

There is no significant difference between the mean achievement of students from group 'E' and 'C' on the test based on previous knowledge. The means and the standard deviations of both groups are given below in Table 12.

Table 12.

Means and standard Deviations on Previous Test.

Groups	Means	Standard Deviations.
Experimental	8.96	3.02
Control	8.92	3.16

As indicated by the above table the means of the two groups ' E ' and ' C ' differ only slightly by 0.04. The difference in the standard deviation is also slight i.e. 0 14. This slight difference in the means and standard deviation of both shows that the groups being homogeneous are equivalent.

ANOVA was used to test the hypothesis 1, its summary is given below.

Table 13

ANOVA of Test Based on Previous Knowledge

Sr.No.	Variability	df	Sum of Squares	Ms (V)
1.	Between Means	1	0.02	0.02
2.	Without Groups.	48	478.80	9.97

$$F = \frac{0.02}{9.97} = 0.0020$$

Required ' F ' value for df 1/48 at 0.05 = 4.03

0.01 = 7.17

Observation and Interpretation :

The ' F ' value is 0.0020 which is very less than the tabled values. We thus accept the null hypothesis and therefore conclude that the means of the two groups do not differ significantly and the two groups ' E ' and ' C ' are equivalent and hence comparable and suitable for the experiment.

4.3. ANALYSIS AND INTERPRETATION OF VARIOUS DATA OBTAINED DURING TESTING :

The researcher used various media packages for teaching the selected units to the subjects. After using the media packages for each sub-unit, the investigator administered an achievement test to both groups, the scores of which are given in the appendix. The data obtained after tests were analysed and interpreted The Unit test No. 1 is ' Beneficial and Nuiscance Micro-organisms and Unit test No II is ' Conservation of Natural resources. '

4.3.1. Unit - I - Beneficial and Nuiscance Micro-organisms.

Package - 1 - Sub-unit 1.

The package 1 for sub-unit 1 is consisted of pictures, transperencies, demonstration, observation, activities and group discussion.

A test was conducted after teaching sub-unit 1. The hypothesis put forward by the investigator was

Hypothesis 2

The achievement of the students of group 'E' is significantly higher than that of group 'C' after the use of multimedia package.

The data available on test no. 1 was analysed to test the above hypothesis.

Table 14

Means and Standard Deviations of Test 1

Groups	Means	Standard Deviations
Experimental	7.16	1.44
Control	5.04	1.04

Both the groups 'E' and 'C' differ in their means in test 1. The difference in the means is 2.12. The difference in the Standard deviations is 0.4. Comparatively the performance of group 'E' is better than 'C.

The investigator used ANOVA to test the above hypothesis no. 2.

Table 15

Summary of ANOVA

Sr.No	Variability	df	Sum of Squares	Variance
1.	Between Means	1	56.18	56.18
2.	Within groups	48	78.32	1.63

$$' F ' = \frac{56.18}{1.63} = 34.3$$

' F ' value for df 1/48 significant at

0.05 level = 4.03

0.01 level = 7.17

Observations and Interpretations :

The ' F ' value is very large than the tabled value. This indicates that the difference is highly significant. Performance of experimental group ' E ' is better than group ' C'.

Thus the hypothesis no. 2 is accepted and retained by the investigator on the basis of ANOVA.

Findings :

1. Group ' E ' performed better than the control group ' C '.
2. Use of pictures, transparencies - demonstrations and group discussion has helped the group ' E ' to understand and grasp the content better than group ' C ' who were taught by traditional method.
3. Use of various media had a positive effect on the understanding and comprehension of the students.
4. It created interest in the subjects and they looked forward to more such kinds of lessons.

To get a concrete idea, it is presented graphically. The table of the frequencies of the figures is given in Appendix.

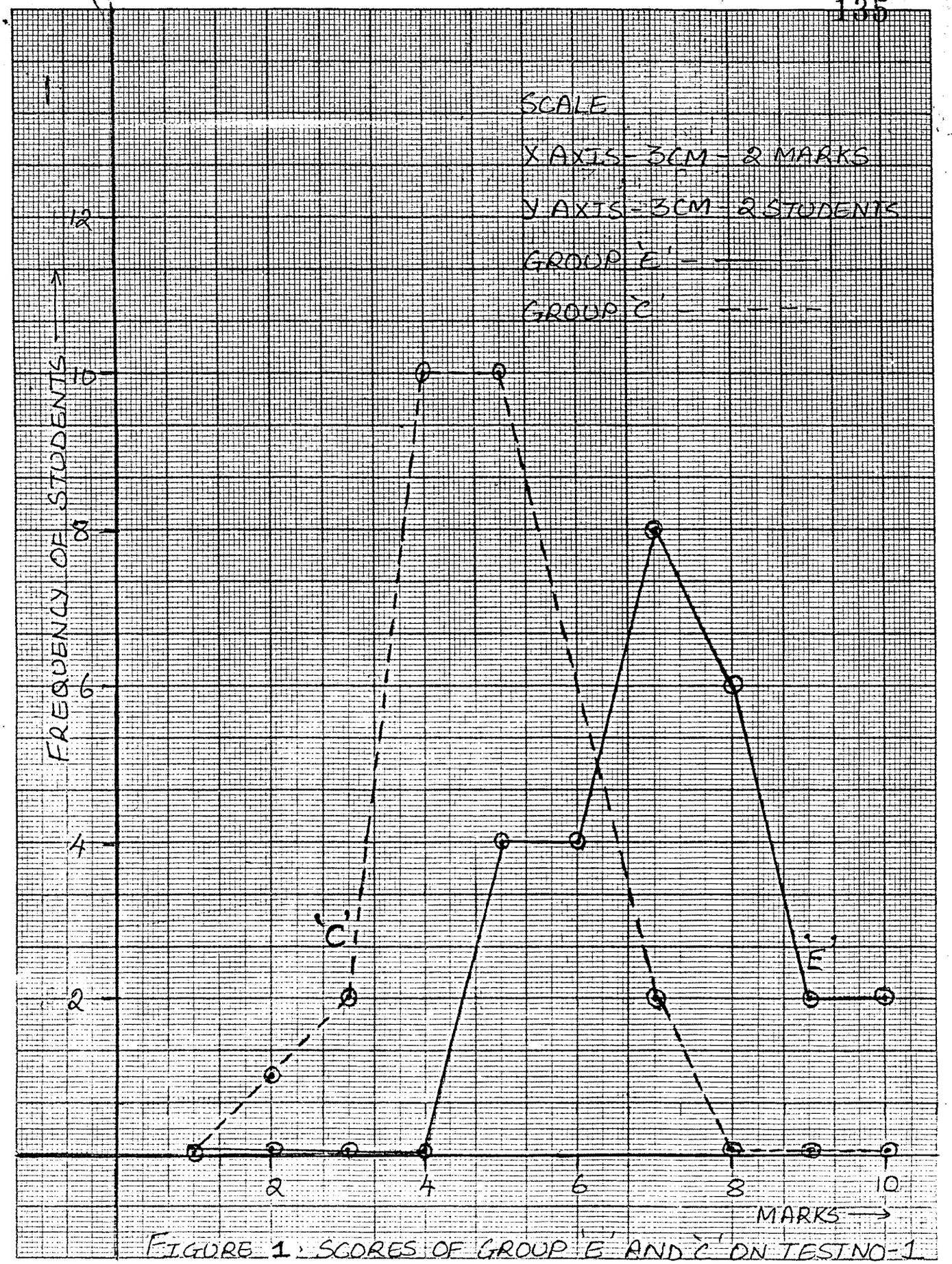

FIGURE 1 : SCORES OF GROUP 'E' AND 'C' ON TEST NO-1

Graph of Scores obtained by Group ' E ' and ' C ' on test No. 1.

The graph shows that the range of marks obtained by group ' E ' is from 5 to 10; Marks obtained by group 'C' are from two to seven only. The peaks of the group ' E ' and ' C ' indicates that the average scores of these two groups are seven and four respectively. The graph of group ' E ' has a right hand shift.

Thus as evidenced by the graph, group ' E ' is superior to group ' C '.

Package 2 - Sub-unit 2.

The package 2 used for teaching sub-unit 2 'Microbial fixing of Nitrogen' contained flashcards, conducting an activity, tape recorder and group discussion. A test of ten marks was administered to note the achievement of both the groups.

. Hypothesis 3 :

The performance of group ' C ' is significantly better than group ' C ' after the use of flashcards, activity, tape-recorder and group discussion.

The data collected after test no. 2 was subjected to analysis.

Table 16

Means and Standard deviation on test No. 2

Group	Means	Standard deviations
Experimental	6.12	1.24
Control	5.16	1.37

Above table shows a difference of 1.04 between means and a difference of 0.13 between Standard deviation. which is slight. It is but indicative of a better performance by group ' E ' in comparison to group ' C. '

Table 17

ANOVA of Scores of Test 2

Sr.No.	Variability	df	Sums of Squares	Variance
1.	Between Means	1	11.52	11.52
2.	Within groups.	48	86	1.79

$$F = \frac{11.52}{1.79} = 6.44$$

' F ' value is significant for df 1/48
at 0.05 = 4.03
at 0.01 = 7.17

Observations and Interpretation :

1. ' F ' value is 6.44 and is significant at 0.05 level.
2. Performance of experimental group ' C ' is better than the control group ' C. '
3. ANOVA of scores of test no. 2 suggests retention of hypothesis no. 3 and rejection of the null hypothesis.

Findings :

1. The use of flashcards help in better recall of the names of different micro-organisms.
2. The activity performed by the students proved useful in comprehension and also helped in clear understanding of the topic.
3. The tape recorder gives a chance for repetition of the sub-unit and assists retention.
4. The group discussion helps in classifying the doubts and discussion of the topic gives better recall and retention.

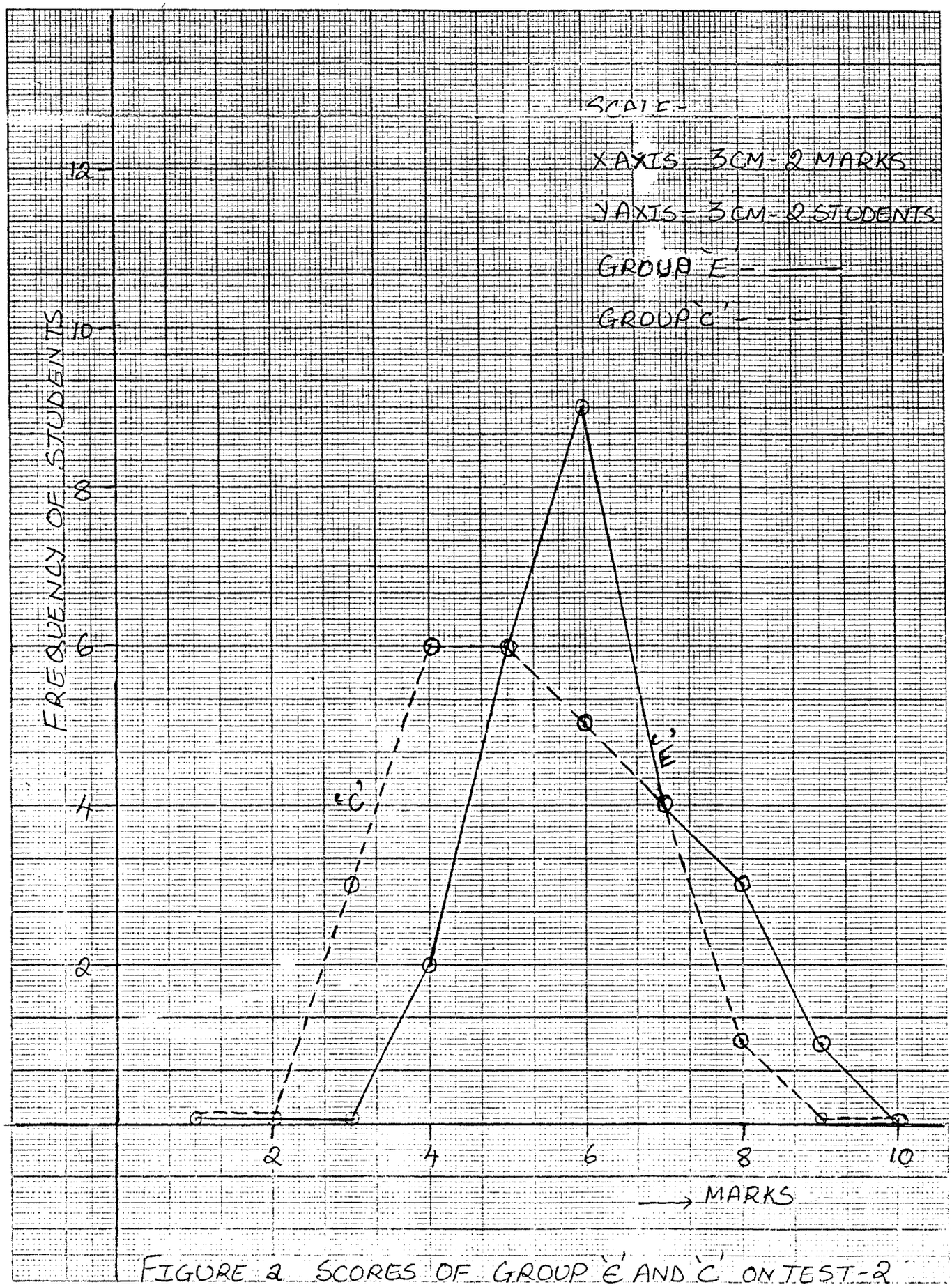

FIGURE 2 SCORES OF GROUP 'E' AND 'C' ON TEST-2

Graph of Scores Obtained by Groups ' E ' and ' C ' on test 2.

As evidenced by the graph the range of scores of group ' C ' is four to nine and frequency is six to nine. Range of scores of group ' C ' is three to eight.

The peaks of ' E ' and ' C ' groups indicates an average score of six and five respectively. The graph of group ' E has shifted towards the right indicating a superior performance of group ' E '.

Package 3 - Sub-unit 3

The third sub-unit ' Nuiscance Microbes' does not ask for too much use of multimedia. The investigator has used transparencies tape recorder and group discussion in this package.

Hypothesis 4

The achievement of group ' E ' is superior to group ' C ' after use of transparencies, tape recorder and group discussion.

The data collected after the test 3 was analysed and interpreted.

Table 18

Means and Standard deviation of Scores on Test 3

Group	Means	Standard deviations
Experimental	6.88	1.50
Control	5.48	1.01

Above table shows that the means of groups differ by 1.40 and standard deviations differ by 0.29. The slight difference indicates better performance of group E.

Table 19

ANOVA of Scores on Test 3

Sr.No.	Variability	df	Sums of Squares	Variance
1.	Between Means	1	24.05	24.05
2.	Within treatment	48	112.88	2.35
		---	-------	
	TOTAL	49	137.38	

$$F = \frac{24.5}{2.351} = 10.42$$

F value significant for df 1/48

0.05 level = 4.03

0.01 level = 7.17

Observation and Interpretation :

1. The calculated ' F ' values is 10.42 and it is more than 7.17. Thus it is significant at 0.01.
2. The performance of experimental group is better than the control group.
3. The hypothesis no. 4 is retained at ' F ' value of 10.42 and the null hypothesis is rejected.

Findings :

1. The use of transparencies stimulates the senses. Retention of events is faster.
2. The tape recorder helps in clear and vivid understanding of the subject matter.
3. The use of various media arouses the interest of the subjects.
4. The group discussion helps the students to open up and ask their doubts, share their ideas and give suggestions.

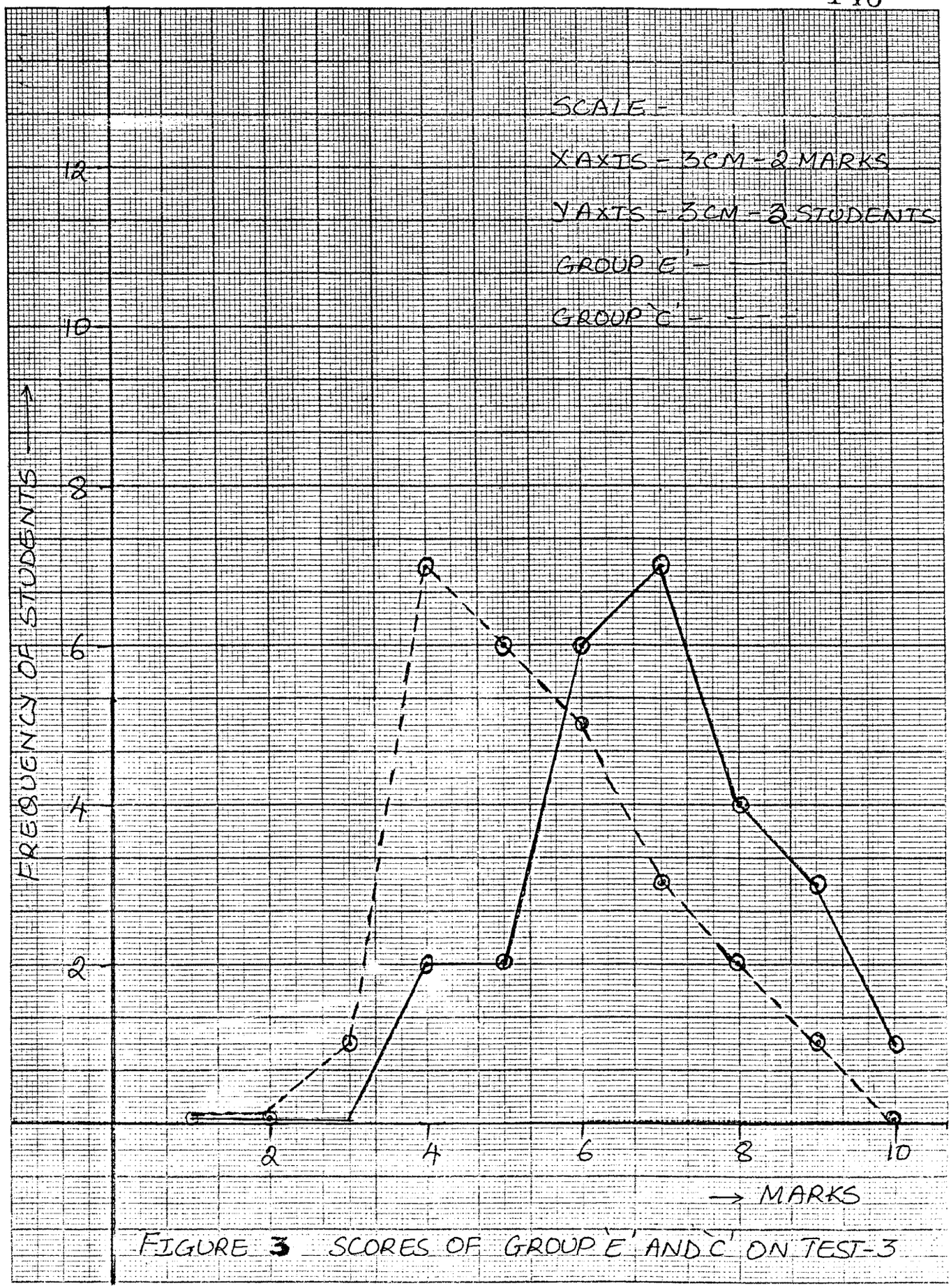

FIGURE 3 SCORES OF GROUP 'E' AND 'C' ON TEST-3

Graph of Scores obtained by Groups ' E ' and ' C ' on test no. 3.

The graph on test no. 3 shows marks of group 'E' varying between four and ten and group ' C ' varying between three and nine. The average of scores according to the graph are seven and four in groups ' E ' and ' C '. respectively.

The shift of the peak of group ' E ' scores towards the right hand side prove the superiority of group ' E ' compared to group ' C '.

Package 4 - Sub-unit 4.

The **fourth** sub-unit is protection and preservation of food. It is a small sub-unit and the investigator used transperencies and flashcards for teaching it. A test was conducted to get the feedback.

Hypothesis 5.

The performance of group ' E ' is significantly better than group ' C ' on test no. 4.

Table 20

Means and Standard Deviation of group on Test 4

Group	Means	Standard Deviations.
Experimental	6.48	1.30
Control	5.04	1.28

The mean achievement of group ' E ' at 6.48 is better than group ' C '. The difference between means and standard deviations is 1.44 and 0.02 respectively. The standard deviations differ slightly. The summary of ANOVA is shown in the table 21.

Table 21

ANOVA of Scores on Test 4

Sr.No.	Variability	df	Sum of Squares	Variance
1.	Between Means	1	25.92	25.92
2.	Within treatment.	48	83.02	1.73
		---	-----	
	TOTAL	49	109.12	

$$F \text{ value} = \frac{25.92}{1.73} = 14.98$$

' F ' value is significant at df 1/48
0.05 level = 4.03

0.01 level = 7.17

Observation and Interpretation

1. The ' F ' value is significant at 0.01.
2. The performance of experimental group ' E ' is better than group ' C '.
3. Hence hypothesis 5 was retained at 0.01 level and the null hypothesis was rejected.

Findings :

1. The students could give illustrations of the havoc micro-organisms play in their daily life.

2. The tape recorder, strengthens the students concentration and listening ability.
3. Explanation given with the help of transperencies and group discussion is useful in developing the ability of synthesis and application of knowledge gained, to novel situations.
4. The use of various aids increased the students ability to interpret and understand the topic thoroughly.

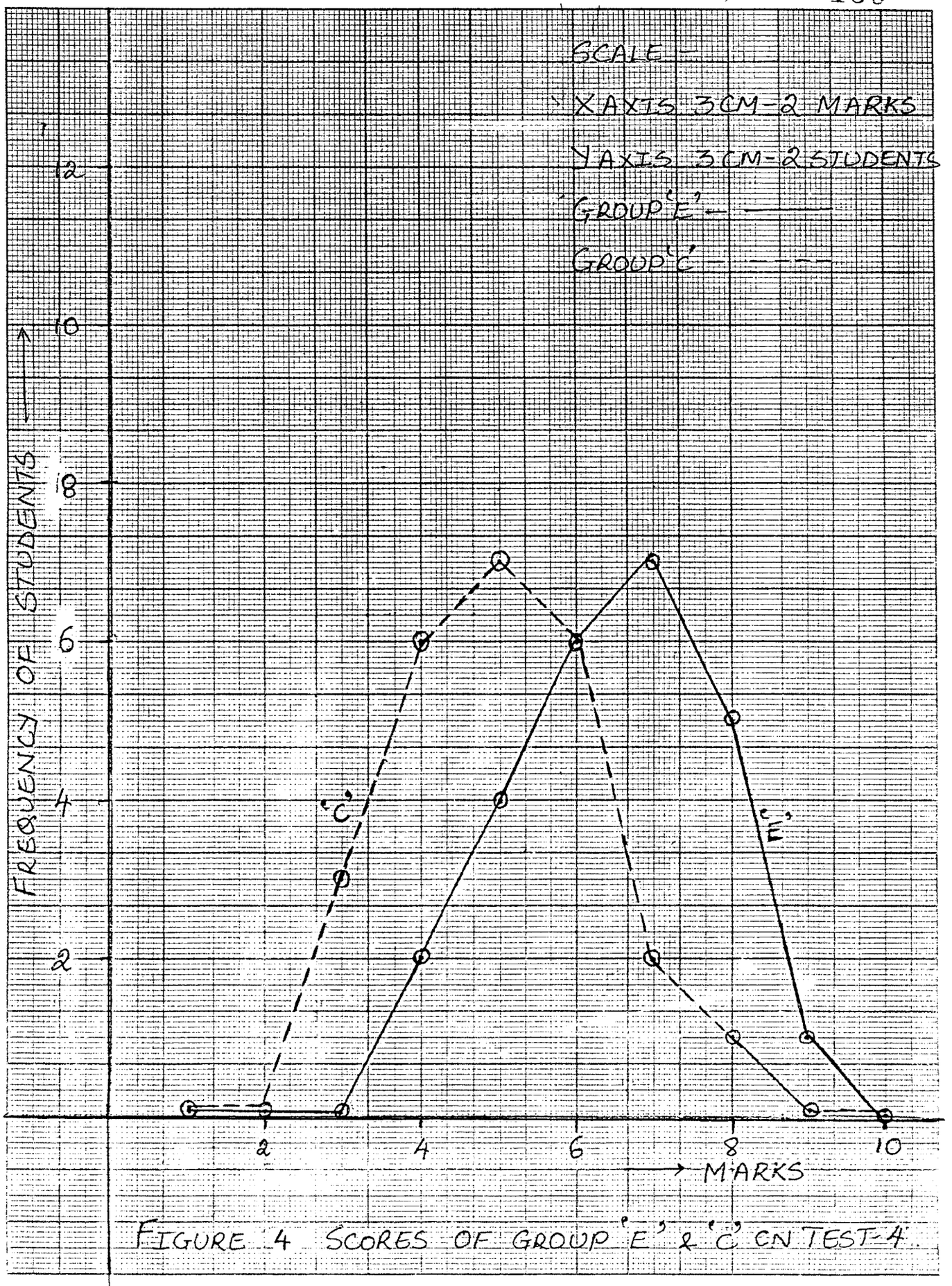

FIGURE 4 SCORES OF GROUP 'E' & 'C' ON TEST-4.

Graph of scores obtained by group ' E ' and ' C on test 4.

The range of scores of group ' E ' is four to nine and that of the control group ' C ' is three to eight. The averages of both groups is five and seven respectively. The group ' E ' graph has shifted towards the right hand side.

The graph shows a better performance by group ' E ' compared to the control group ' C '.

COMPREHENSIVE UNIT TEST I

After the conclusion of an entire unit and administering four tests based on sub-units, the investigator conducted a Comprehensive unit test of forty marks to study the learners achievement in unit I. The Comprehensive Unit test was based on all the sub-units.

Hypothesis 6 The performance of the experimental group ' E ' is significantly higher and better than the control group ' C ' in the comprehensive unit test I due to the use of the experimental method i.e. multimedia package.

Table 22

Means and Standard Deviations of scores on Comprehensive Unit Test I

Group	Mean	Standard Deviations.
Experimental	23.56	5.93
Control	19.96	4.83

As evident from the above data both groups differ in the mean performance by 3.6 and difference in standard deviation is 1.1. The scores of both the groups show a marked difference.

The investigator analysed the scores by ANOVA to check the hypothesis 6.

Table 23

ANOVA of scores of both Groups On Comprehensive Unit Test I

Sr.No.	Variability	df	Sum of Squares.	Variance
1.	Between Means	1	162	162
2.	Within treatment	48	1465.12	30.52
		--	-------	
		49	1627.12	

$$' F ' = \frac{162}{30.52} = 5.31$$

Required F value for df 1/48
0.05 level = 4.07

0.01 level = 7.17

Observation and Interpretation :

1. The calculated ' F ' value is 5.31. It is greater than 4.07. Hence ' F ' value for 1/48 is significant at 0.05.
2. The mean performance shows a marked difference but the difference in the standard deviations is less.

3. The hypothesis 6 is accepted at df value 0.05 and the null hypothesis is rejected by the investigator.

Findings :

1. The scores obtained by the subjects in the tests of various sub-units and the one comprehensive unit test prove that media certainly play an important role in delivering the subject matter to the subjects.
2. The flashcards and the transparencies are very useful in developing recall and the retention power of the students. It affects comprehension and application.
3. The demonstration of the activities develop the practical skills of the students and gives them concrete information.
4. The use of various media stimulate the senses of the subjects and arouse their curiosity and interest.

5. The multimedia packages develop a scientific attitude in the students.
6. The skills of application and appreciation develop in the students as a result of transperencies and flashcards.
7. The tape recorder also play an important and impressive part for the comprehension and knowledge aspect of the cognitive structure.
8. The investigator also carried out group discussion under the group-leader and in her presence. These group discussions help in clarifying facts. The students show good and interested participation.
9. This multimedia package was beneficial to all the types of learners, whether average good or slow.
10. The media help the teacher in deploying his skills more effectively and applying them more widely.

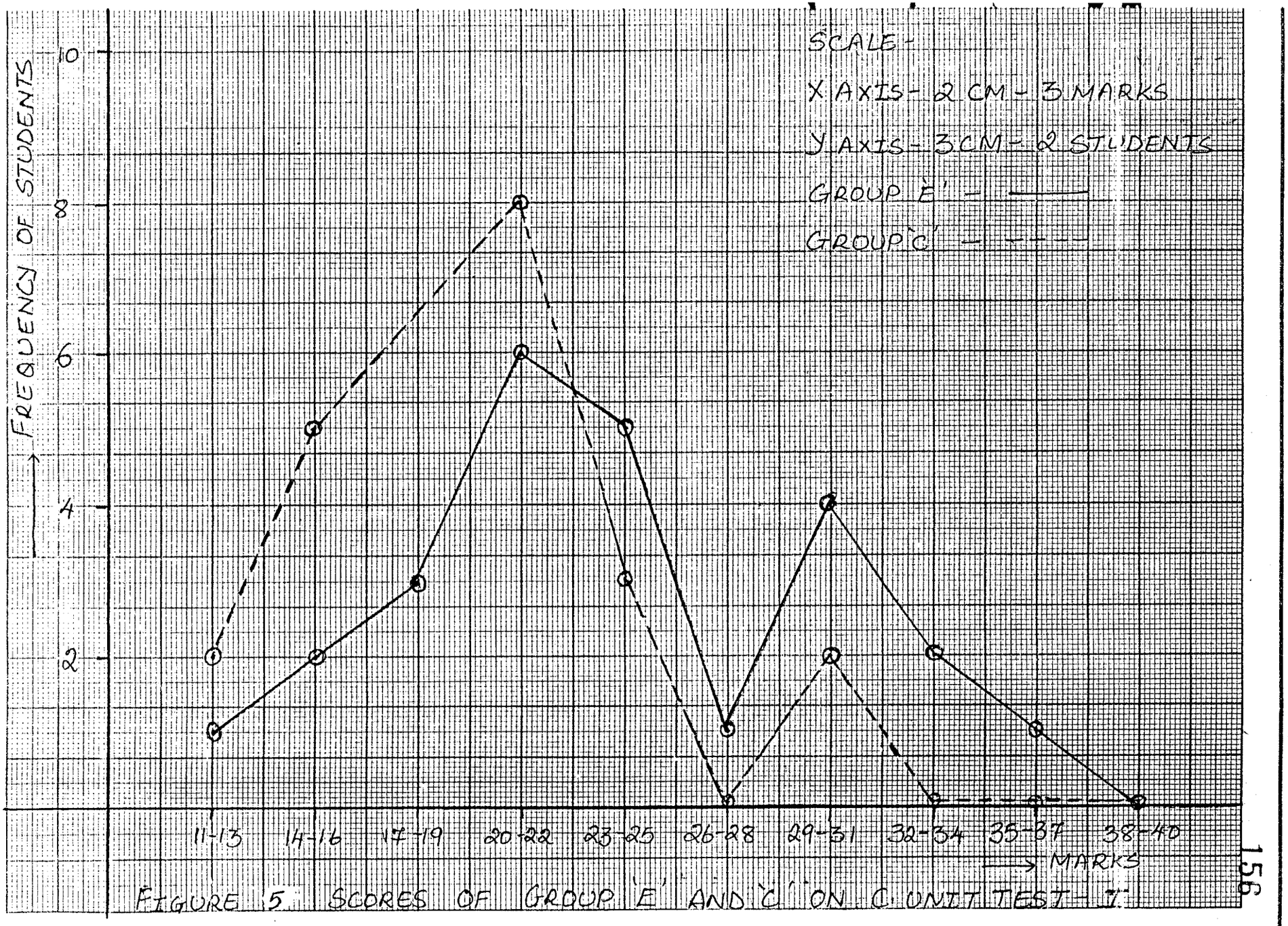

FIGURE 5 SCORES OF GROUP 'E' AND 'C' ON C. UNIT TEST - I.

Graph of scores of groups ' E ' and ' C ' on Comprehensive Unit Test I based on Unit I

The graph of comprehensive unit test 1 shows that marks of group ' E ' range from eleven to thirty seven marks in group ' C ' vary from eleven to thirty one. The graph of group ' E ' goes upwards whereas that of group ' C ' comes down towards the right hand side.

Thus it is clearly evident from graph that performance of group ' E ' in the comprehensive test is impressive as compared to that of group ' C '.

The second unit selected by the investigator was ' Conservation of Natural Resources. ' The description of the media packages used in this unit are given in the following paragraphs.

4.3.2. Unit II : Conservation and Preservation of Natural Resources :

Package 5 - Sub-unit II - 1

This package included posters, charts, flashcards, flannel boards, computer aided instruction and group discussion.

After delivering the subject matter, the investigator administered a test of ten marks.

Hypothesis 7

The performance of group ' E ' is impressive than that of group ' C ' in test 5 after the use of the multimedia package.

The means and standard deviations of both groups were computed and is tabulated as follows.

Table 24

Means and Standard Deviation of both Groups on Test 5

Groups	Means	Standard deviations
Experimental	5.56	1.61
Control	4.56	1.33

The mean achievement of group ' E ' is better than group ' C '. The difference between means is 1. The standard deviation differs slightly by 0.28.

The summary of ANOVA of test 5 scores is given below.

TABLE 25

ANOVA of Scores of Both Groups on Test 5

Sr.No.	Variability	df	Sum of Squares	Variance
1.	Between Means	1	12.5	12.5
2.	Within treatment	48	108.	2.25

		49		

$$' F ' = \frac{12.5}{2.25} = 5.56$$

Required F value for df 1/48 : 0.05 = 4.07

0.01 = 7.17

Observation and Interpretation :

1. The obtained F value is 5.56 and exceeds the tabled value of 4.07 at 0.05 level. Hence, the F value is significant at 0.05 level.
2. The hypothesis was retained on the basis of ANOVA and the null hypothesis was rejected.
3. The performance of group ' E ' is better than group ' C '.

Findings :

1. The use of flashcards and flannel boards help the subjects recognize the various uses of natural resources in their daily life.
2. The use of transperencies help in better retention and stimulate their senses. It also arouses their interest and help the ' application ' step of the cognitive domain.
3. Computer aided instruction provide additional knowledge and develop a scientific attitude.

4. Display of various charts and pictures increases the learners participation and gives additional information. Students also prepared some of the aids.

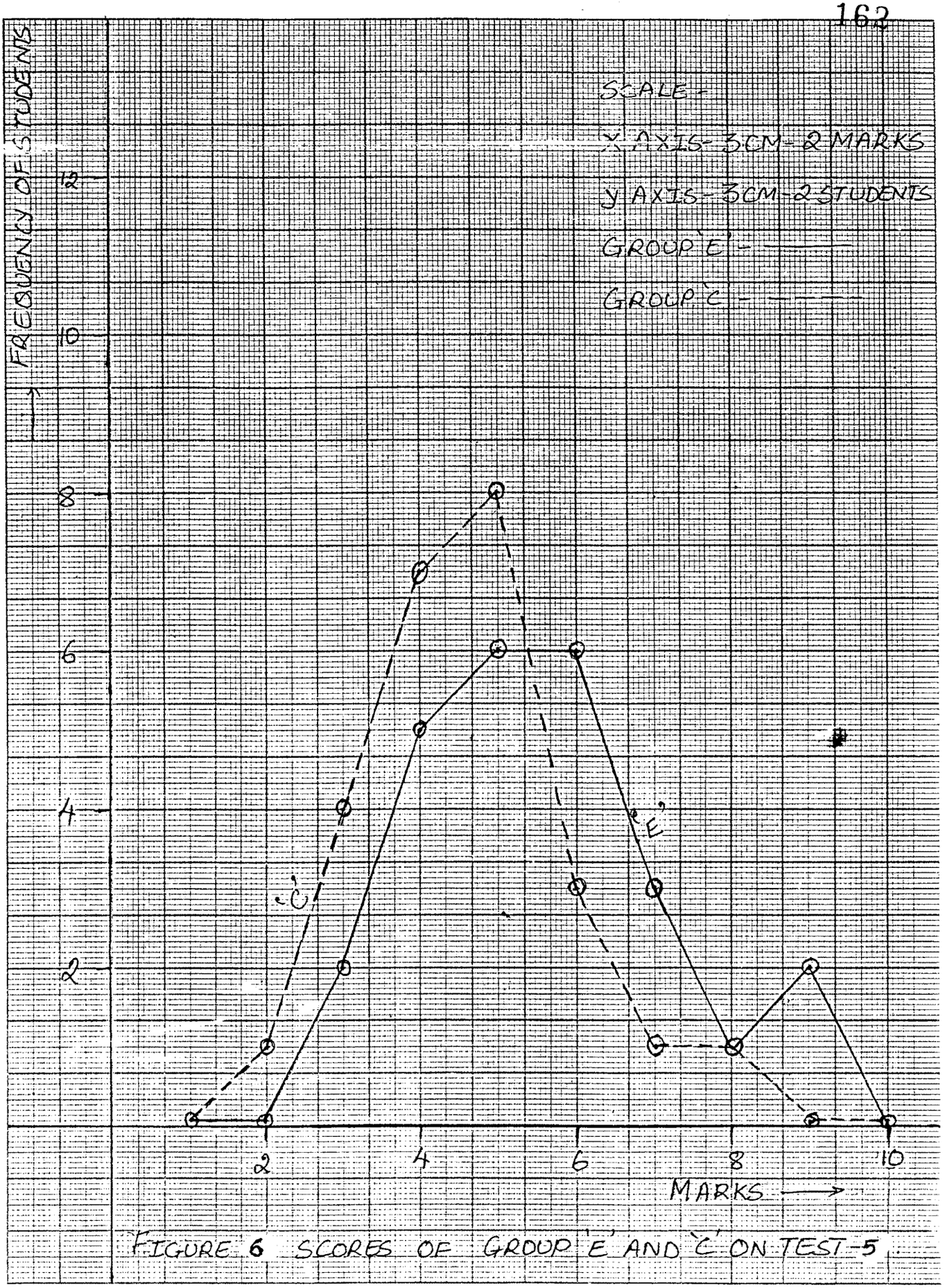

FIGURE 6 SCORES OF GROUP 'E' AND 'C' ON TEST-5

Graph of scores of Groups ' E ' and ' C '
on Test 5.

The graph indicates a range of scores from three to nine for the experimental group. The scores of the ' C ' group range from two to eight. The averages of groups ' E ' and ' C ' are six and five respectively.

The graph of the experimental group ' E ' has shifted towards the right and this clearly indicates a better performance by group ' E. '

Package 6 - Sub-unit II 2

The investigator used Transperencies, slides of fauna and flora, posters for teaching of ' Types of Natural resources. ' After delivering the goods a small test was administered to the subjects. The researcher hypothesised that

Hypothesis 8 :

The achievement of group ' E ' is significantly better than that of group ' C ' in the test based on ' Types of Natural Resources. '

Table 26

Means and Standard Deviation of the scores of both groups on Test 6.

Group	Means	Standard Deviations
Experimental	5.08	1.50
Control	4.16	1.63

As evidenced by the above table, the mean achievement of group ' E ' is better than group ' C ' and they differ by 0.92 and standard deviation differ slightly by 0.13.

The ANOVA of the scores was calculated and its summary is as follows :

Table 27

ANOVA of scores of both groups on Test 6

Sr.No.	Variability	df	Sum of Scores	Variance
1.	Between Means	1	10.58	10.58
2.	Within treatment	48	115.2	2.4
		---	------	
		49	125.78	

$$F = \frac{10.58}{2.4} = 4.41$$

F value significant at df 1/48 at 0.05 = 4.07

0.01 = 7.17

Observation and Interpretation:

1. The calculated F value is 4·41 and it is larger than the tabled value of 4.07 at 0.05 level. Hence, F is significant at 0.05.
2. The null hypothesis is rejected and the hypothesis put up by the investigator is accepted at 0.05 level.

3. Performance of the experimental group ' E ' is better than that of group ' C ' which is the control group.

Findings :

1. Students understand the different types of natural resources because of the use of transperencies and posters
2. The flora and fauna slides help them realise, how plant and animals are natural resources.
3. The posters help the students understand how the fauna and flora of a place affected the cultural life and tourism of a country e.g. Kangaroos. of Australia, elephants of Thailand.
4. **The use of various media help the students to realise how human beings are the largest** consumers of Natural resources and exploit them to the maximum.
5. The use of multimedia package help in application and development of scientific attitude.

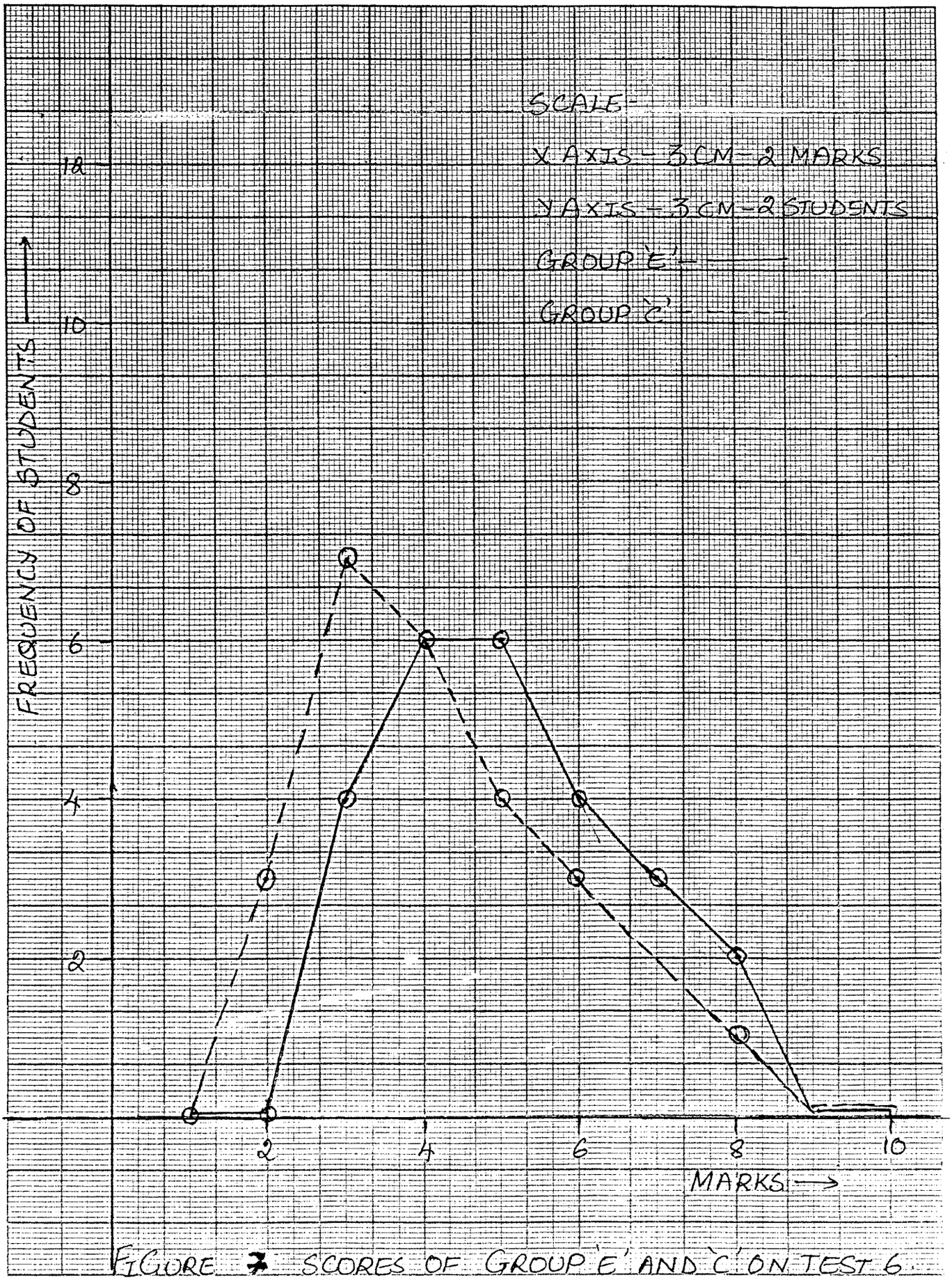

FIGURE 3 SCORES OF GROUP 'E' AND 'C' ON TEST 6

Graph of Scores of group ' E ' and ' C '
on Test 6

The graphical presentation of scores of the two groups ' E ' and ' C ' on test 6 shows a superior performance by the experimental groups.

The scores of group ' E ' are between three and eight and the average score being five. In the group ' C ' scores were between two and eight. The frequency is the greatest for the score three. The average score in the ' C ' group is three.

The graph of the experimental group ' E ' has shifted towards the right side.

Package 7 - Sub-unit II - 3

Renewable and Non-renewable resources was a small sub-unit and was introduced to the subjects with the help of charts, tape recorder and transparencies.

The investigator then conducted a test on the above sub-unit to get a judgement of the students achievement. The means and standard deviations of the scores were calculated.

Hypothesis 9 :

The achievement of group ' E ' is better than that of control group ' C ' in test 7 after the use of experimental method.

Table 28

Means and Standard deviations of Scores of both the Groups on Test 7.

Group	Means	Standard Deviations.
Experimental	5.84	1.34
Control	4.32	1.10

The difference between means and standard deviations is 1.52 and 0.24 respectively. The tabled

values indicate an impressive and better performance by the experimental group, ' E '.

Table 29

ANOVA of Scores of both Groups on Test 7

Sr.No.	Variability	df	Sum of Squares	Variance
1.	Between Means	1	29.02	29.02
2.	Within treatment.	48	72.80	1.55
		---	-----	
		49	101.82	

$$\text{F value} = \frac{29.02}{1.55} = 19.22$$

F value is significant at 0.05 level= 4.07

0.01 level = 7.17

Observation and Interpretation :

1. The calculated ' F ' value is 19.22 which exceeds the tabled value of 7.17 at 0.01. Hence, F is significant at 0.01 level.
2. The performance of group ' E ' is better than group ' C ' as a result of the multimedia package.

3. The hypothesis 9 is retained at F value of 0.01 and the null hypothesis is rejected.

Findings :

1. Students understood the meaning of the renewable and non-renewable effortlessly with the help of transperencies and tape recorder.
2. The tape recorder increased the comprehensiveness of the topic correlating the topic with examples from daily life made understanding faster.
3. The additional knowledge provided by the investigator with the help of tape recorder and transperencies resulted in better application.
4. The learners understood the severity of the problem and realised the need for conservation of non-renewable resources.

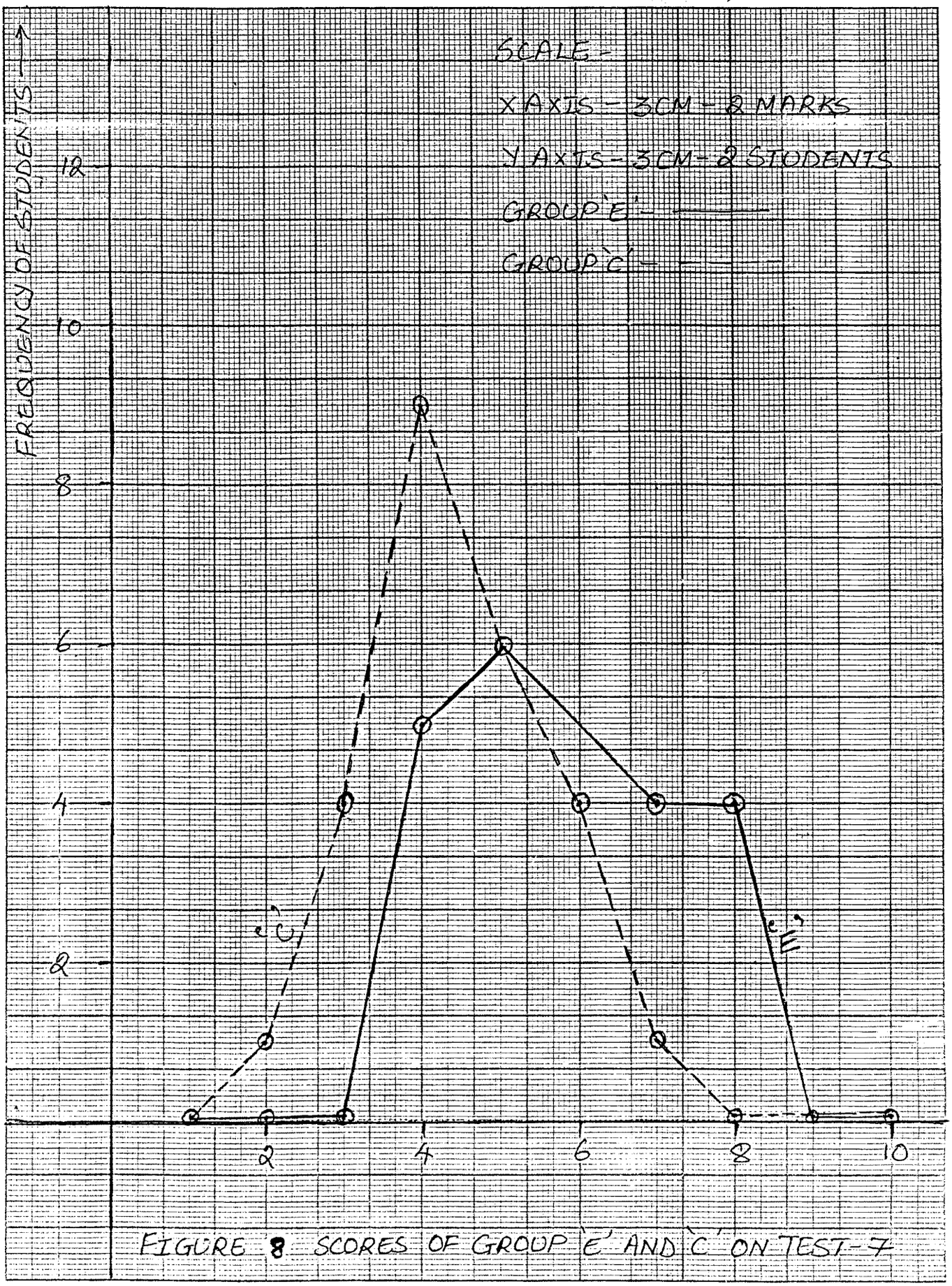

FIGURE 8 SCORES OF GROUP 'E' AND 'C' ON TEST-7

Graph of Scores of Groups ' E ' and ' C '
on Test 7

The graph of test 7 indicates that the scores of group ' E ' vary from four to eight whereas that of group ' C ' lie between two and seven.

The average score of group ' E ' and ' C ' is five and four respectively.

The graph of group ' E ' indicates its superiority over group ' C '.

Package 8 - Sub-unit II - 4

This sub-unit deals with the ' Proper Use of Natural Resources ' for which the investigator combined transparencies, tape recorder and printed material.

A test was administered by the investigator after delivering the content.

Hypothesis 10 :

The performance of the experimental group ' E ' is significantly better than that of control group ' C ' in test 8 after the use of package.

The standard deviations and the means of the scores of test 8 are given below.

Table 30

Means and Standard deviation of both Groups on Test 8

Groups	Means	Standard Deviations.
Experimental	5.88	1.37
Control	4.4	0.97

The mean achievement of group ' E ' is better than that of group ' C '. The difference between means is 1.48. The standard deviation differs slightly by 0.4.

The investigator then calculated the ANOVA to test the above hypothesis put forward by the investigator.

Table 31

Summary of ANOVA on Test 8

Sr.No.	Variability	df	Sum of Squares	Variance
1.	Between Means	1	27.38	27.38
2.	Within treatment	48	70.64	1.471
		---	------	
		49	98.02	

$$F \text{ value} = \frac{27.38}{1.471} = 18.61$$

F value significant at df 1/48

0.05 level = 4.07

0.01 level = 7.17

Observation and Interpretation

1. The calculated F value is 18.61 which is more than 7.17. Thus the ' F ' value is significant at 0.01 level.

2. The ' F ' value favour the acceptance of the hypothesis 10 and rejects the null hypothesis.
3. The performance of group ' E ' is better than the group ' C. '

Findings :

1. Transparencies contribute in increased comprehension of the subject matter. The learners understand that how man was exploiting nature to fulfil all his selfish needs.
2. Tape recorder help in better retention.
3. The printed material help in opinion building and also give extra knowledge to the subject thereby arousing their interest.
4. It also help in development of a scientific attitude.
5. The students themselves also became a bit more careful in using the varied natural resources in their day to day life.

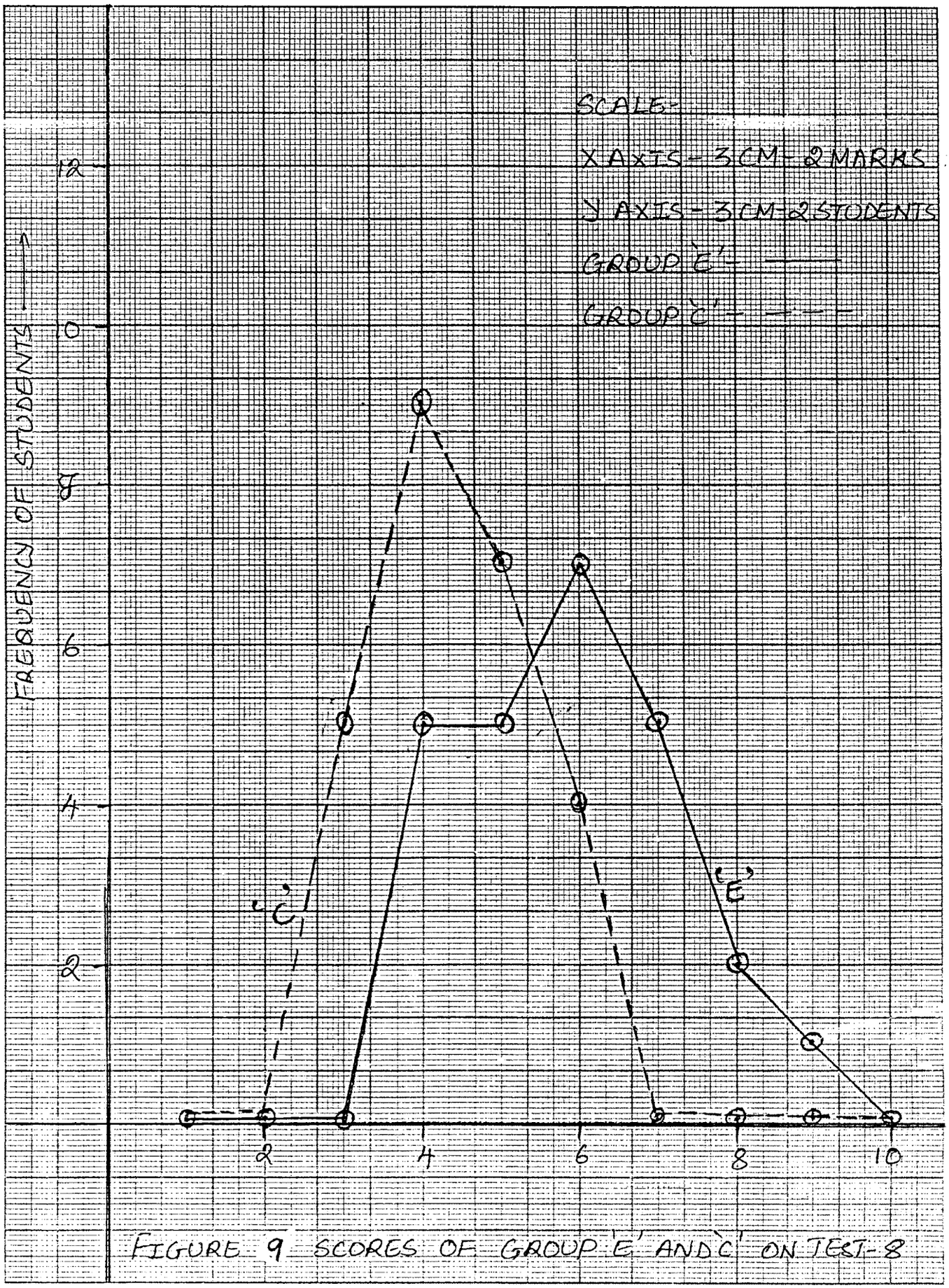

FIGURE 9 SCORES OF GROUP 'E' AND 'C' ON TEST-8

Graph of Scores of Groups ' E ' and ' C ' on Test 8

The graph shows that the range of scores of group ' C ' lie between four to nine and that of group ' C ' range from three to six. The average of scores in the two groups ' E ' and ' C ' are six and four respectively.

The graph of group ' C ' goes downwards towards the right hand side. The graph of group ' E ' shifts towards the right hand side and indicates a better performance by the experimental group ' E ' and thus its superiority.

Package 9 - Sub-unit II - 5.

In the next sub-unit, ' Illeffects of wastage of Natural resources ' the investigator has used printed material, transperencies and group discussion. To measure the achievements of both the groups, the investigator conducted a test. She hypothesised that

Hypothesis - 11

The performance of the experimental group ' E ' is significantly better than control group ' C ' after use of multimedia package.

The means and standard deviations of the scores of both groups are tabled as follows.

Table 32

Means and Standard Deviations of both Groups on Test 9

Groups	Mean	Standard Deviations
Experimental	6.2	1.41
Control	4.6	1.13

The difference between the means is 1.6 and the standard deviations differ by 0.28 which is very less. The table indicates better performance of group ' C ' in comparison to group ' C '.

The summary of ANOVA is tabled below.

Table 33

Summary of ANOVA

Sr.No.	Variability	df	Sum of Squares	Variance
1.	Between Means	1	32	32
2.	Within treatment.	48	82	1.71
		---	---	------
		49	114	

$$' F ' = \frac{32}{1.71} = 18.71$$

Table ' F ' value at df 1/48 at 0.05 = 4.07

0.01 = 7.17

Observation and Interpretation.

1. The calculated ' F ' value is 18.71 and is greater than 7.17. Thus the difference between both the groups is significant at 0.01 level.

2. The performance of the experimental group is better than the control group.
3. The hypothesis 8 is retained at F 0.01 and the null hypothesis is rejected.

Findings :

1. The transparencies help in projecting the illeffects of improper use of natural resources. It resulted in better comprehension and development of scientific attitude.
2. The printed material focus the various ways which result in the wastage of natural resources.
3. The tape recorder and the transperencies highlight the depletion of the Ozone layer, its disastrous consequences and also its uses.
4. The learners grasp the need to take some recuperative steps to save the environment.
5. The learners also show better application of the knowledge gained.
6. The use of printed materials update their knowledge aroused their interest, and give some additional knowledge.

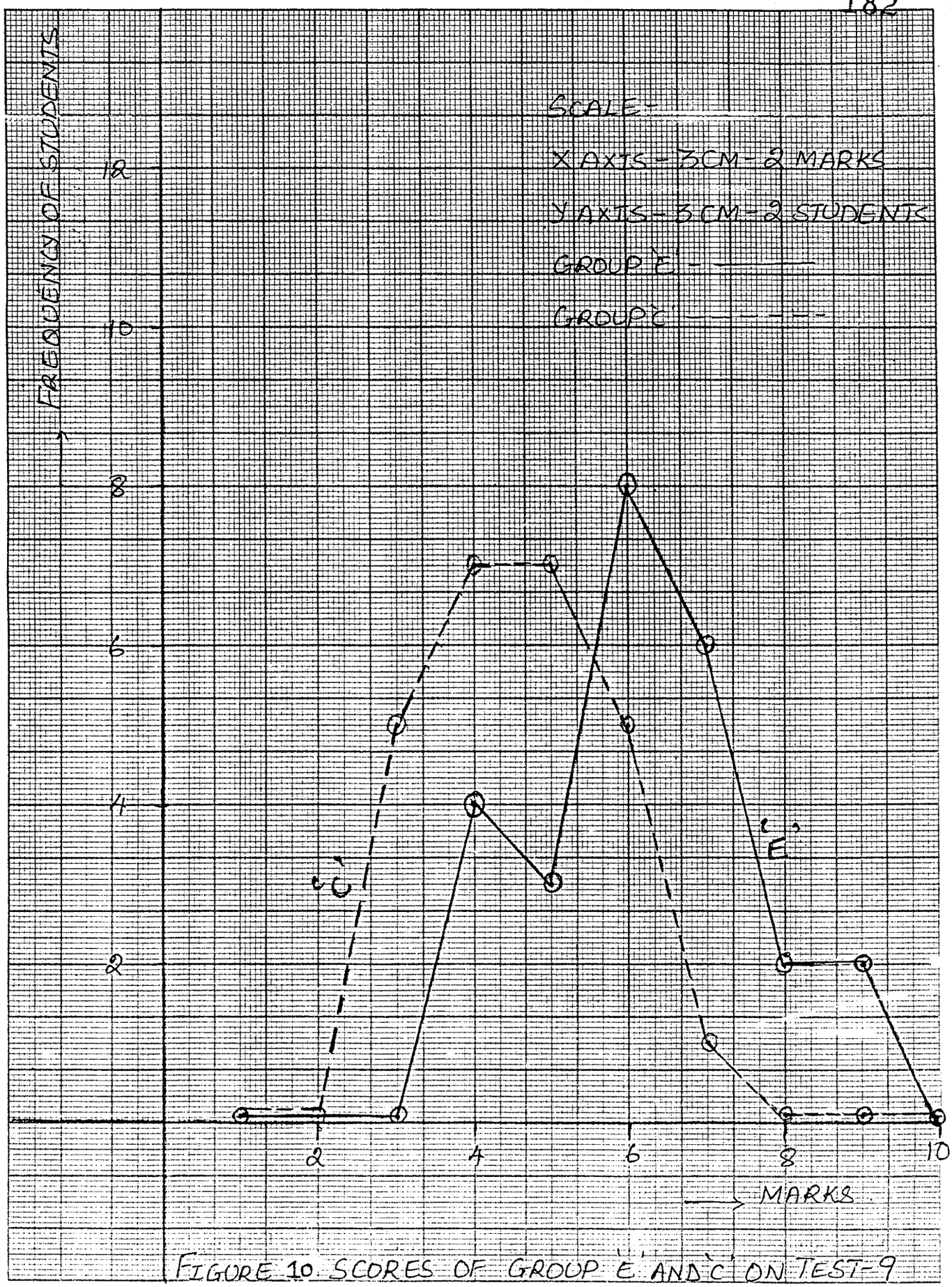

FIGURE 10 SCORES OF GROUP 'E' AND 'C' ON TEST-9

Graph of Groups ' E ' and ' C ' on Test 9
On Scores Obtained.

The graphical representation, on this test shows that scores in group ' E ' range from four to nine and that in the group ' C ' lie between three and seven.

The average of scores in ' E ' and ' C ' are six and five respectively.

The graph shows a better performance by group ' E '.

Package 10 - Sub-unit II - 6

The last sub-unit if Unit II is ' Planned use of Natural Resources. ' This sub-unit educates the students against wastage of Natural resources and teaches them how to use them in a planned way.

The investigator used transperencies, tape recorder and group discussion in the media package.

After teaching of this sub-unit, the investigator administered a test, to measure their achievement.

Hypothesis 12

The performance of the experimental group is significantly better and impressive than that of the control group after the use of multimedia package.

The means and standard deviations of the scores of both the groups in test 10 are given below.

Table 34

Means and Standard deviations of Scores on Test 10

Groups	Mean	Standard deviations
Experimental	5.88	1.35
Control	4.49	1.20

The means and standard deviation values tabled above differ by 1.39 and 0.10 respectively It indicates better performance of group ' E ' comparatively with group ' C. '

The summary of ANOVA is tabled below.

Table 35

Summary of ANOVA

Sr.No.	Variability	df	Sum of Squares	Variance
1.	Between Means	1	24.5	25.4
2.	Within treatment.	48	83.88	1.75
		--	-----	
		49	108.38	

$$' F ' = \frac{25.4}{1.75} = 14.51$$

F is significant at 0.05 = 4.07

0.01 = 7.17

Observation and Interpretation :

1. The calculated ' F ' value is 14.51 which is more than 7.17. Thus the difference between groups is significant at 0.01 level.

2. The mean performance of experimental group ' E ' is better than group ' C '.
3. The hypothesis 12 is accepted at the calculated ' F ' value and the null hypothesis is rejected.

Findings :

1. The tape recorder increase comprehension, retention and recall. The explanation could be replayed.
2. The use of transparencies help in better understanding of subject matter.
3. The group discussion help the subjects to deliver their views and clear their doubts on how to use the resources in a planned way.
4. The group discussion gives the students a chance of introspection of how they contribute to the national wastage of natural resources.
5. The student pledge to check the wastage of natural resources on a personal front.

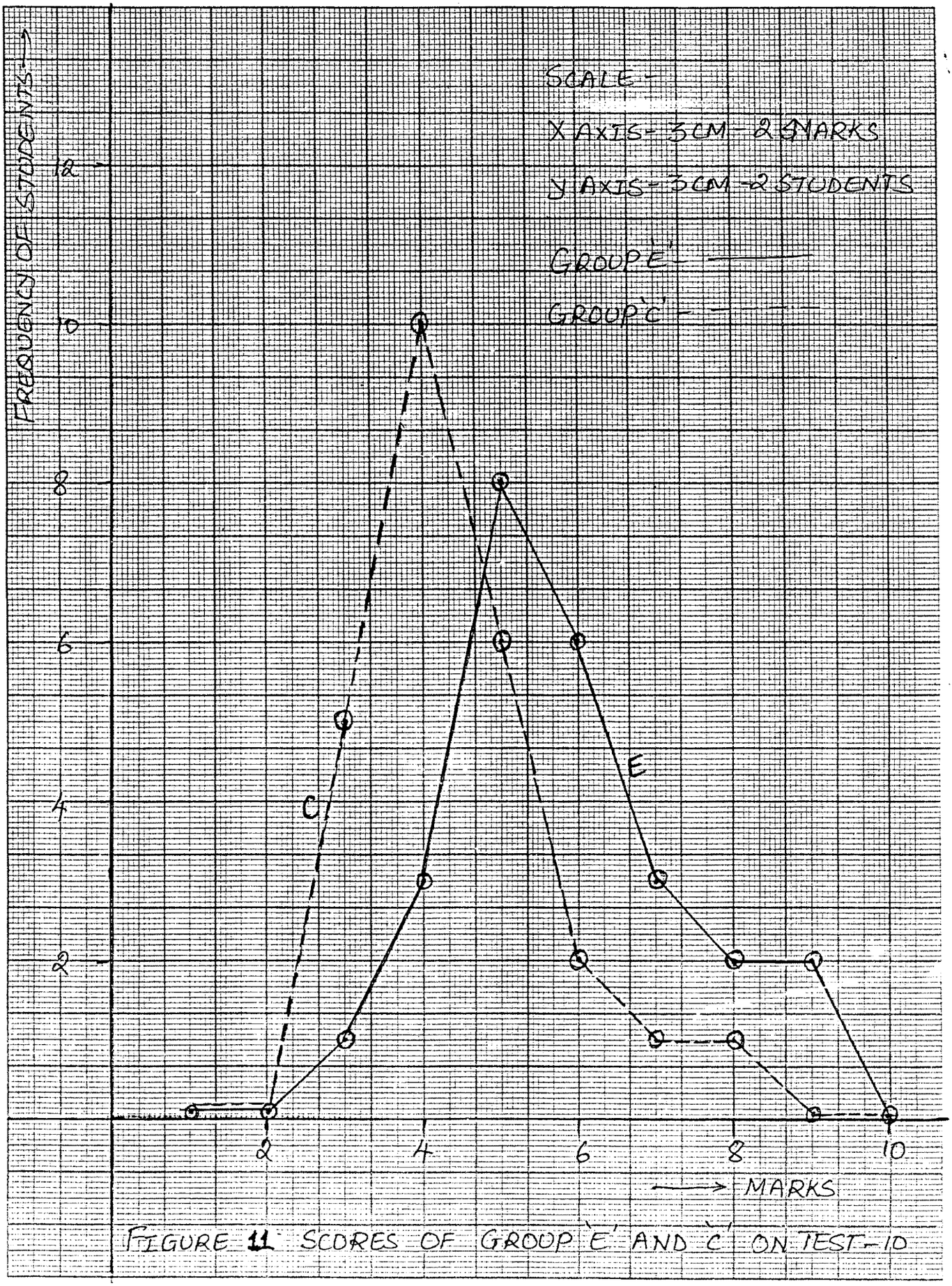

FIGURE 11 SCORES OF GROUP 'E' AND 'C' ON TEST-10

Graph of Scores obtained by Groups ' E ' and ' C ' on Test 10

The scores in group ' E ' range from three to nine and scores in group ' C ' lie between three and eight.

The average of group ' E ' is five and that of group ' C ' is four.

The graph of group ' E ' shifts towards the right which clearly indicates a superior performance by the group ' E '.

COMPREHENSIVE UNIT TEST II

The above sub-unit was the last part of Unit II. After delivering the goods the investigator conducted a comprehensive unit test II of forty marks to measure the achievement of both groups.

The performance of the experimental group ' E ' is significantly higher than that of the control group ' C ' in comprehensive unit test II during the use of the multimedia package.

The means and standard deviations of scores of unit test II are tabled below.

Table 36

Means and Standard Deviations on Comprehensive Test II

Groups	Mean	Standard Deviations
Experimental	25.04	4.94
Control	20.0	4.54

The difference between means and standard deviations is 5.04 and 0.40 respectively. The mean difference is significant whereas standard deviation difference is slightly less.

To test the hypothesis 13, the investigator calculated ANOVA. Its findings are tabled below.

Table 37

Summary of ANOVA

Sr.No.	Variability	df	Sum of Squares	Variance
1.	Between Means	1	317.54	317.54
2.	Within treatment	48	1124.96	23.43
		---	-------	
		49	1442.5	

$$\text{' F ' value} = \frac{317.54}{23.43} = 13.55$$

Tabled F value is significant at

0.05 level = 4.07

0.01 level = 7.17

Observation and Interpretation :

1. The ' F ' value is 13.55 and it is greater then 7.17. Thus the ' F ' value is significant at 0.01 level.

2. The hypothesis is retained at 0.01 level and the null hypothesis is rejected.

Findings :

1. The use of transparencies increase students ability to identify and describe the uses of natural resources in their everyday life.
2. The flashcards favour retention and recall and help the students ability to understand the variety of natural resources and help to identify their type and sources whether air, water or land.
3. The flannel board help in better application of knowledge.
4. The tape recorder increase the ability to comprehend.
5. The use of a variety and new media help in arousing the curiosity and interest of the learners.
6. The group discussion help in sharing of views and ideas.

7. The printed material help the students to realise the objectives of inclusion of unit II ' Conservation of Natural Resources ' in their syllabus. It also helps them realise the challenges that a nation had to meet as a whole and how could they play their part in conservation and protection of the environment in the new millennium.

FIGURE 12 SCORES OF GROUP E AND C ON CRITICAL THINKING TEST-II

Graph of scores of groups ' E ' and ' C '
on Comprehensive unit Test II based on Unit II

The graph of the comprehensive unit test II shows that marks of group ' E ' range from seventeen to thrity seven and marks of group ' C ' vary frcm eleven to thirty one. The graph of group ' E ' goes upwards towards the right hand side whereas the graph of group ' C ' comes down towards the right hand side.

It is thus clearly evidenced from graph that performance of group ' E ' in the comprehensive unit test II is impressive as compared to that of group ' C. '

4.4. Coefficient of Correlation :

It is important to examine the relationship of one variable to another than to consider the statistical description of a single variable. No single statistical procedure has opened up. So many new avenues of discovery in psychology and education as that of correlation. It is the method of summarizing the relationship between two sets of data.

How can one express the relationship between two measures ? Are certain abilities closely related and other relatively independent ? Does a given aptitude test predict success on a job ? Are football players good at academic achievement ?

In order to answer such questions we must have a pair of measures for each individual.

Therefore, the investigator calculated the coefficient of correlation of both groups on the two comprehensive unit tests to determine the consistency of the performance of the students and the experiment conducted by the researcher.

Interpretation of Coefficient of Correlation in Verbal terms.

In the interpretation of coefficient of Correlation two things must be considered.

1. The first is the sign of the coefficient.
2. It is the magnitude or size of the coefficient which indicates the degree or closeness of the relationship.

The table given below will be useful in interpreting

1.	from 0.0 + 0.02	denotes slight correlation indifferent or negligible relationship.
2.	from + 0.20 to + .40	denotes low correlation definite but small relationship.
3.	from + .40 to + .70	denotes moderate correlation substantial relationship.
4.	from + .70 to + .90	denotes high correlation marked relationship.
5.	from + .90 to + .99	denotes high correlation. very dependable relationship
6.	from + 1.00	denotes perfect relationship

Table 38

Coefficient of Correlation of Group ' E '.

Test No.	Coefficient of Correlation
Comprehensive Unit Test I and II	0.83

Observation and Interpretation :

The coefficient of Correlation between two Comprehensive unit test I and II is 0.83. This indicates high correlation and a marked relationship. It is found that there is **consistency** between the performance of the learners and the action of the teacher.

Table 39

Coefficient of Correlation of Group ' C '.

Test No.	Coefficient of Correlation
Comprehensive Unit test I and II.	0.43

Observations and Interpretation :

The coefficient of Correlation between the two Comprehensive unit tests I and II is 0.43. It indicates moderate correlation and a substantial relationship.

Findings :

The students performance was worth appreciating. They performed their duties sincerely. There was no problem of indiscipline and none of the students remain absent during the experiment.

The tests prepared by the researcher were the same type. Teaching was also done sincerely. Necessary and effective media was used in preparation of packages.

4.5. CONCLUSIONS :

The chapter ' Analysis and Interpretation of Data ' throws light on how growing media can help in better communication between the teacher and the taught.

The analysis of scores on various tests are indicative of the fact that the experimental group performed better than the control group because they were taught by the experimental method i.e. the use of media packages.