CHAPTER NO VI

ANALYSIS AND INTERPRETATION OF
THE DATA COLLECTED
Analysis and Interpretation of Data Collected:

The whole scheme of this research work is explained in chapter III. The instructional materials developed accordingly, are discussed in chapter IV. Field trials were conducted on different samples of the different areas and the data were collected. Tables of means are provided in chapter V.

In this final chapter the analysis and interpretation of data are made in the light of the hypotheses given in chapter III.

In order to satisfy the criteria of metric equivalence the data were analysed with the help of ANOVA technique. Significance of differences between the different means were evaluated at .01 and .05 levels of significance. In order to do the multiple comparison between the means of different groups the data were further analysed by using Scheffe test. Scheffe test being a rigorous technique, the significances were found at the lower level of .10 level.

This chapter includes the following points:

6.1. Bearing of results on the hypotheses.
6.2. Discussion of results.

6.1. Bearing of results on the hypotheses:

6.1.1. This part of this section discusses the bearing of results on the hypotheses with respect to the effects of different methods on the achievements of different cultural groups on the immediate post test.
6.1.1.1. Main Hypotheses - (Total Effect)

Hypotheses (1) states that there would be no significant differences between the effects of the three methods 'E', 'I' and 'S' respectively within the achievements of same cultural groups and between the achievements of different cultural groups on the immediate post-test as a whole.

As the hypotheses is concerned with two main points; viz: three methods and three groups, it will be convenient to divide this hypotheses into two parts:

(a) According to methods and (b) according to groups.

(a) This part of the hypotheses states that there would be no significant differences between the effects of the three methods 'E', 'I' and 'S' respectively within the achievements of the same cultural groups.

Figure I shows that the mean differences within the achievements of the groups are not comparatively large. They do not look significant. This is confirmed from the table in App.1 and App.2. The table shows that the mean differences within the achievements of the groups are not significant at any level.

Hence this null hypotheses is accepted.

(b) This part of the hypotheses states that there would be no significant differences between the effects of the three methods 'E', 'I' and 'S' respectively between the achievements of different cultural groups.
Figure 2 shows that the differences between the mean score for the achievements of different cultural groups with respect to the effects of different methods are appreciably large.

This is further confirmed by ANOVA results in Table No. App.3. The table shows that the differences between the mean scores for the achievements of different cultural groups with respect to each method is highly significant at .001 level.

Hence this null hypotheses is rejected.

In order to evaluate the significance of differences between the multiple different means, analysis is done by Scheffe test which indicates that the mean scores for Urban groups are significant in relation to the mean scores for Adivasi groups and Rural groups at .001 level.

The mean differences for Rural groups are significant in relation to the mean scores for Adivasi groups at .001 level.

6.1.1.2. Subsidiary Hypotheses:

Hypotheses as regards to the differences between the effects of methods:

6.1.1.2.1. Hypothesis (1) states that there would be no significant differences between the effects of three methods in relation to the achievements of Adivasi group on the immediate post test.
From figure 3 it is clearly seen that the differences within the mean scores of different methods are appreciably large.

This picture is further confirmed from the table no App. 4. It shows that there are significant differences between the mean scores of different methods at .001 level.

Hence this null hypotheses is rejected.

Scheffe test further indicates that for Adivasi groups the mean scores for I method are significant in relation to E method and S method at .001 level. Hence method I seems to be more effective for Adivasi group as a whole.

The mean scores for E method are not significant in relation to S method at any level. But the differences are positive.

Hypotheses (2) states that there would be no significant differences between the effects of three methods in relation to the achievements of Rural groups on the immediate post test.

In figure 4 it can be clearly seen that mean scores of different methods are appreciably large.

Table No. App.5 conveys that the difference between the mean scores of these methods are significant at 0.05 level.

Hence this null hypotheses is rejected.
Scheffe test further suggests that for Rural groups the mean scores for E method are significant in relation to the mean scores for I method at .001 level.

The mean scores for E method are not significant in relation to the mean scores for S method. But the differences are positive.

The mean scores for S method are significant in relation to the mean scores for I method at .05 level.

In this group E method is more powerful than the other two methods.

6.1.1.2.3. Hypotheses (3) states that there would be no significant differences between the effect of three methods in relation to the achievements of Urban group on the immediate post test.

From figure 5 it is clearly seen that there is no appreciable difference between the mean scores of different groups.

This is also confirmed from table No. App 6. The table shows that there are no significant differences between the means of different methods at any level.

Hence this null hypotheses is retained.

Hypotheses as regards to the differences between the achievements of different groups :-

6.1.1.2.4. Hypotheses (4) states that there would be no significant difference between the effects of Fruitive method on the achievements of different cultural groups on the immediate post test.
From figure No. 6 it is clearly seen that the differences between the mean scores of the different groups are appreciably large.

This result can further be confirmed from the table No. App 7. It shows that the differences between the mean scores of different groups are significant at .001 level.

Hence this null hypotheses is rejected. The Scheffe test further indicates that in case of method E the mean scores for Urban groups are significant in relation to the mean scores for Adivasi groups at .001 level.

The mean scores for Urban group are significant in relation to the mean scores for Rural group at .05 level.

The mean scores for Rural area are significant in relation to the mean scores for Adivasi groups at .001 level.

Urban area has shown better achievements in this method than that of the other two groups.

6.1.1.2.5. Hypotheses (5) states that there would be no significant differences between the effects of Ironic method on the achievements of different cultural groups.

Figure No. 7 shows that the differences between the mean scores of the different cultural groups are appreciably large.
Table No. App.3 shows that the differences between the mean scores of different groups are significant at .001 level.

Hence this null hypothesis is refuted.

The Scheffe test further suggests that in case of method 1 the mean scores for Urban groups are significant in relation to the mean scores for Adivasi and Rural groups at .001 level.

Mean scores for Rural groups are not significant in relation to the mean scores for Adivasi group at any level. The differences are negative. It means that Adivasi groups can do better in this method than Rural groups.

6.1.1.2.6. Hypotheses (6) states that there would be no significant differences between the effects of Symbolic method on the achievements of different cultural groups.

Figure No. 8 shows appreciably large difference between the mean scores of different cultural groups.

Table No. App V also confirms that the difference between the mean scores of different groups are significant at .001 level.

Hence this null hypothesis is refuted.

Scheffe test further indicates that in case of S method the mean scores for Urban groups are significant in relation to the mean scores for Adivasi groups and the mean scores for Rural groups at .001 level.
The mean scores for Rural groups are significant in relation to the mean scores for Adivasi group at .001 level.

To summarize, the hypotheses with respect to the effects of methods on different cultural groups is accepted, whereas the hypotheses with respect to the achievements of different groups is rejected.

Out of the six subsidiary hypotheses only one hypothesis is retained i.e. hypotheses no. 3. Other five hypotheses are refuted.

It means that all the groups differ significantly with respect to their achievements in different methods.

6.1.2. Thus part of this section deals with the comparison of achievements of the students on different mode questions on the immediate post-test.

According to the conservation principle of concept Bruner contents that if a concept is thoroughly learnt by a student, he can express the knowledge of this concept with equal efficiency through each of the modes viz; enactive, iconic and symbolic.

Taking this as a rationale to see to what extent the student can express the above mathematical concept through each of the modes. This gives us the idea of
inter mode comparison of the result on the immediate post test i.e. comparison of the achievements of the students of different groups on different mode questions.

In the part 6.1.1. the effects of different methods as a whole were evaluated. But to find the achievements of the different groups on different mode questions on test 1, same raw scores were rearranged according to the response modes in every group.

Responses of each mode questions were separated from all the responses on the test 1.

There were in all 60 students in each group. Hence there were 60 responses on each mode questions. \( \text{i.e.g.} \) In adivasi group there were 60 students selected for the study. All the sixty students answered all the questions in test 1. Hence there were 60 responses on enactive mode questions included in the first cell in the table given below, 60 responses on iconic mode questions entered in second cell and sixty responses on symbolic 100 students for this group on different mode questions.
Similarly the data for the other two groups were arranged in the three responses respectively and have been given in the table given above. Thus there were in all 540 responses treated for intermode comparison.

6.1.2.1. Results on Hypotheses:

Main Hypotheses - (Total Effect)

Hypotheses 1) states that there would be no significant differences within the same cultural groups and between the different cultural groups (i.e. urban, rural and urban) with respect to their achievements on questions as related to three different modes (i.e. enactive, iconic and symbolic) included in the immediate post-test.

This hypotheses is concerned with two way analysis of the effects of the test with regard to the achievements of the groups as a whole.
Accordingly this above hypotheses may be transformed into two hypotheses as follows:

(A) Hypothesis (a) with regards to the modes of expression states that there would be no significant differences within the same cultural groups with respect to their achievements on questions as related to three different modes (i.e. enactive, iconic and symbolic) included in the post test.

Figure No. 9 shows that the main difference within the achievements of the groups on the question of different modes, through are not comparatively large, but are coming to be significant at .001 level.

Hence the hypotheses is rejected.

In order to evaluate the significance or differences between the multiple means, analysis is done by Schaffe test which indicates that the mean scores for iconic mode are significant in relation to the mean scores for Enactive mode at .05 level. This is shown by negative sign for the differences in this table. Mean score for Enactive mode questions is less than that of iconic mode questions. It shows that iconic mode is predominant in this area.

Mean scores for enactive mode are not significant in relation to the mean scores for symbolic mode but the differences are positive.
The mean scores for Iconic mode are significant in relation to the mean scores for symbolic mode at .001 level.

(b) The other part of the hypothesis states that there would be no significant differences between the achievements of different cultural groups i.e. Adivasi, Rural and Urban, on the questions on each mode.

Figure No. 10 shows that the differences between the mean scores for the achievements of different cultural groups with respect to their achievements in each mode are appreciably large.

These differences are confirmed from the table No. App. 12. The table shows that the differences between the mean scores for the achievements of different cultural groups with respect to each mode is significant at .001 level.

Hence the null hypotheses is refuted.

This is further indicated by Scheffe test that the mean scores for urban group are significant in relation to the mean scores for Rural group and Adivasi group at .001 level.

The mean scores for Rural group are significant in relation to the mean scores for Adivasi group.

With respect to the achievements of the test urban group proves the superiority over the other two groups.
6.1.2.2. Subsidiary Hypotheses One way Analysis

Hypothesis as regards to the differences within the achievements of the same cultured group.

6.1.2.2.1. Hypotheses (1) states that there would be no significant differences within the achievements of Adlai Group on Enactive Iconic and symbolic mode questions on the immediate post test.

Figure No.11 expresses that there are differences within the mean scores of different modes.

These differences are clearly shown in the table No.App. 13. The figures, in this table, make it clear that there are significant differences within the mean scores of different mode at .001 level.

Hence this null hypotheses is refuted.

Scheffe test further indicates that

1. The mean scores for Iconic mode are significant in relation to the mean scores for enactive mode, at .001 level. The negative sign indicates that Iconic mode is more powerful in this area.

2. The mean scores for Symbolic mode are not significant in relation to the mean scores for Enactive mode; negative sign in this case proves that Enactive mode is not effective on Symbolic mode, and

3. The mean scores for Iconic mode are significant in relation to the mean scores for Symbolic mode at .001 level.
6.1.2.2.2. Hypothesis (2) states that there would be no significant differences within the achievements of Rural Groups on Enactive Iconic and Symbolic mode questions in post-test.

Graphical picture does not give much differences in the mean scores of the modes (figure No. 12).

But from the table No. App.14 it is made clear that the differences within the mean scores of different mode are significant at .001 level.

Hence this null hypotheses is rejected.

Further analysis by Scheffe test indicates that

1. Mean scores for Iconic mode is not significant in relation to Enactive mode at any level. However it is more than that of cultural modes.

2. Mean Scores for Enactive mode are significant in relation to the mean scores for Symbolic mode at .001 level, and

3. Mean scores for Iconic mode are significant in relation to the mean scores for Symbolic mode at .001 level.
6.1.7.2.3. Hypotheses (3) states that there would be no significant differences within the achievements of Urban Groups on Enactive Iconic and Symbolic mode question in the immediate post-test.

Figure No. 13, shows that the differences between the means scores of different modes of expression are comparatively small.

These differences are clearly shown in the table, No. App.15. The table shows that there are significant differences within the means of different modes at .05 level.

Hence this null hypothesis is rejected. Scheffe test which analyses, further indicates that

1. The mean score for Enactive mode is not significant in relation to the mean scores for Iconic mode at any level.

2. The mean score for Symbolic mode are significant in relation to the mean scores for enactive mode at .01 level.

3. The mean score for Symbolic mode are significant in relation to the mean scores for Iconic mode and is superior than Iconic mode.

Hypothesis as regards to the differences between the achievements of different cultural groups.
6.1.2.2.4. Hypothesis (4) states that there would be no significant differences between the achievements of Adivasi, Rural and Urban groups on enactive mode questions in the immediate post test.

Graphical figure no.14 shows that the differences between the mean scores of the three groups are significantly large.

This differences are proved to be significant at .001 level by the table No. App.17.

Hence this null hypotheses is refuted.

To analyse these results Scheffe test was used. It indicates that

1. The mean scores for Urban groups are significant in relation to Adivasi group and in relation to Rural group at .001 level, and

2. The mean scores for Rural group are significant in relation to the mean scores for Adivasi group at .001 level.

6.1.2.2.5. Hypotheses (5) states that there would be no significant differences between the achievements of Adivasi, Rural and Urban group on iconic mode questions in the immediate post test.

Figure No.15 shows that the differences between the mean scores of the three group are significantly large.
Table No. App 17 proves this through the figures in it. It shows that the differences between the mean scores of the different groups are significant at .001 level.

Hence this null hypothesis is rejected.

This is further indicated by Scheffe test. Mean scores for Urban groups are significant in relation to Adivasi groups and Rural groups at .001 level.

Mean scores for Rural groups are significant in relation to the mean scores for Adivasi group at .001 level.

6.1.2.2.6. Hypotheses (6) states that there would be no significant differences between the achievements of Adivasi, Rural and Urban groups on Symbolic mode questions on immediate post test.

The graph expressed in figure No. 1o shows that mean scores of the three groups differ from each other to a great extent.

This can further be studied carefully from the table No. App.18. The table shows that the differences between mean scores of different groups are significant at .001 level.

Hence this null hypothesis is rejected.
This is further indicated by Schuflfe test. Mean scores for Urban groups are significant in relation to Adivasi and Rural groups at .001 level. Mean scores for Rural groups are significant in relation to Adivasi groups at .001 level.

With respect to the main hypotheses in relation to the differences between the different cultural groups and within the same cultural groups in relation to their achievements on different mode questions, the hypotheses is rejected.

With respect to the subsidiary hypotheses all the six hypotheses were refuted. Hence from this result it is clear that all the three groups differ significantly with respect to their achievements on different mode questions.

6.I.3. This part of this section 1 of this chapter deals with the effects of different methods on the achievements of the students of different cultural groups on the delayed post test.

In the first two parts the results on the immediate post test were dealt with. It is also interesting to find out the retention on the part of the students and to find out the effect of different methods on the retention.
6.1.3.1. Main Hypotheses (Total Effects)

Hypotheses (1) states that there would be no significant differences between the effects of the three methods E, I and S respectively within the achievements of same cultural groups and between the achievements of different cultural groups on delayed post test as a whole.

Thus hypotheses is concerned with two main points, viz; three methods and three groups. Hence this above hypotheses may be transformed into two hypotheses as follows:

(a) Hypotheses with regard to the effects of three different methods.

(b) Hypotheses with respect to the achievements of three different groups.

(c) Hypotheses with regards to the effects of three different methods states that there would be no significant differences between the effects of three different methods E', I' and S' respectively within the achievements of the same cultural groups on delayed post test.

Figure No.1/ shows that the mean difference between the effects of three methods is not comparatively large, they do not look significant.
This is confirmed by the results on Table No. App. 18. The table shows that the mean differences within the achievements of the groups are not significant at any level.

Hence this null hypotheses is accepted.

(b) Hypotheses with respect to the achievements of three different groups states that there would be no significant differences between the effects of three different methods between the achievements of three different cultural groups 'A', 'B' and 'C' respectively on the delayed post test.

Figure No. 18 shows that the difference between the mean scores for the achievements of different cultural groups with respect to the effects of different methods are appreciably large.

This is further confirmed by the ANOVA results in the table No. App. 20. The table shows that the differences between the mean scores for the achievements of different cultural groups with respect to each method is highly significant at .001 level.

Hence this null hypotheses is rejected.

In order to evaluate the significance of differences between the multiple different means,
analysis is done by Scheffe test, which indicates that the mean scores for Urban groups are significant in relation to the mean scores for Adivasi groups and Rural groups at .01 level.

The mean differences for Rural groups are significant in relation to the mean score for Adivasi groups at .05 level.

6.1.3.2. Subsidiary Hypotheses:

Hypothesis 3 regards to the differences between the effects of methods.

6.1.3.2.1. Hypotheses (3) states that there would be no significant differences between the effects of three methods in relation to the achievements of Adivasi groups on delayed post test.

Figure No.19 shows that the differences within the mean scores of different methods are comparatively large.

This picture is further confirmed from the table No.App 21. It shows that there are significant differences between the mean scores of different methods at .001 level.

Hence this null hypotheses is rejected.
The mean scores for method are significant in relation to the mean scores for symbolic method at .001 level.

For Adivasi group the mean scores for method are not significant in relation to the mean score for method at any level. The differences are not positive which shows that method I is more effective than that of method E.

For Adivasi group the mean scores for method are not significant in relation to the mean scores for symbolic method at .001 level.

For Adivasi group the mean scores for method are not significant in relation to the mean scores for symbolic method at .001 level.

Hence the null hypotheses is refuted.

Scheffe test further indicates that:

The mean scores for method are significant in relation to the mean scores for symbolic method at .001 level.

The mean scores for method are significant in relation to the mean scores for method at .001 level.

Hence this null hypotheses is refuted.

For Rural group the mean scores for method are significant in relation to the mean score for method at .1 level.
The mean scores for E method are not significant in relation to the mean scores for S method at any level but the differences are positive.

The mean scores for I method are not significant in relation to the mean scores for S method at any level. But the mean scores are negative which means that S method is more effective than I method for this area.

6.1.7.2.3. Hypotheses (3) states that there would be no significant differences between the effects of three methods in relation to the achievements of Urban groups on delayed post test.

From figure No.21 it can be seen that there is no appreciable difference between the mean scores of different groups.

This is also confirmed from Table No. App 73. The table shows that there are no significant differences between the mean of different methods at any level.

Hence this null hypotheses is retained.

Hypotheses as regards to the differences between the achievements of different groups :-

6.1.7.2.4. Hypotheses (4) states that there would be no significant differences between the effects of Enactive method on the achievements of different cultural groups on the delayed post test.
(231)

From figure No. 22 it is seen that the differences between the mean scores of different groups are not comparatively large.

This result is confirmed from Table No. App 24, that there are no significant differences between the mean of different groups at any level.

Hence this null hypotheses is accepted.

6.1.3.2.5. Hypotheses (5) states that there would be no significant differences between the effects of [konnic method of different cultural groups in delayed post test.

Figure No. 23 shows that the differences between the mean scores of different cultural groups are comparatively large.

This is confirmed by table no. App.25, which shows that the differences between the mean scores of different groups are highly significant at .001 level.

Hence this null hypotheses is refuted.

The Scheffe test further indicates that in case of method 'I', the mean scores for group U is significant in relation to the mean scores for group A and group R.

The mean scores for group R are not significant in relation to the mean scores for group A. The differences are negative which means that the achievements of group A is better than the achievements of group R in this method.
6.1.3.2.6. Hypotheses (6) states that there would be no significant differences between the effects of Symbolic method on the achievements of different cultural groups.

Figure No. 74 shows that the differences between the mean scores of different cultural groups are appreciably large.

This is also confirmed by Table No. App. 76. It shows that the differences between the scores of different cultural groups are highly significant at .001 level.

Hence the null hypotheses is refuted.

Scheffe test further indicates that in case of 5 method the mean scores for Urban group are significant in relation to the mean scores of Adivasi groups and Rural groups at .001 level.

The mean scores for Rural group is significant in relation to the mean scores for Adivasi group at .001 level.

In summary, the hypotheses with respect to the effects of method on different cultural groups is accepted. On the other hand the hypotheses with respect to the achievements of different cultural groups is rejected.

Out of the six subsidiary hypotheses only two hypotheses are retained i.e. hypotheses no. 5 and 4, whereas the other four hypotheses are refuted.
6.2. Discussion of Results:

The differences in the achievements of mathematical concepts of the children of different groups have been statistically evaluated in the previous section of this chapter. In this section we are looking closely to the differences and trying to relate them to the differences in characteristics of different groups.

Hence the results will be discussed in connection with the generalization made in chapter III (Page No.78) with regards to the effectiveness of methods 'E', 'I' and 'S' in relation to the differences among three groups 'A', 'R' and 'U'. Two generalizations made in this respect in chapter III (Page No.78) are as follows:

(1) With respect to methods:

It is hypothesized that the effect of methods 'E' is more than method 'I' which in turn is more effective than method 'S'.

(2) With respect to groups:

It is hypothesized that the groups will differ with respect to the achievements as follows:

Achievements of group 'U' will be more, of group 'A' will be less and of group 'R' will be in between. In order to have proper perspective of the performance of the students, two tables (for each section A, B and C) concerning the difference between methods and between groups were formulated while designing and analyzing the result.
6.2.1. The overall picture based on the differences between the effects of three methods detailed on table No. are classified in table No. 6.2.1.1. Summary of effects of methods on immediate post test:

Table No.3 relating to the post test tells us that method 'E' has got one significant positive difference, one non-significant difference, out of 6, over method 'F'. Negative sign indicates that method 'E' is significant over method 'F'.

Method 'I' has got three non-significant differences over method 'S'. Method 'I' has got one positive significant difference one non-significant difference over the method 'S'. Even in this case there is one negative difference which is significant which shows that method 'S' is significant over method 'I'.

Comparison of different methods i.e. effectiveness of Stimulus mode:

In case of the groups the differences on the achievements are highly significant at .001 level indicating that groups do differ with respect to the achievements of mathematical concepts.

The overall effects show that there are no significant differences between the mean scores on different methods. It reveals that all the three methods are equally effective.
In order to discuss the differences in the groups due to their characteristics, the discussion of the group will be discussed first than the effects of the methods will be considered on this discussion.

Table No. 6.2
Levels of significance for differences between groups on immediate post test:

<table>
<thead>
<tr>
<th>GROUPS ---</th>
<th>U &gt; A</th>
<th>U &gt; R</th>
<th>R &gt; A</th>
</tr>
</thead>
<tbody>
<tr>
<td>METHODS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EFFECT</td>
<td>+ .001</td>
<td>+ .05</td>
<td>0.001</td>
</tr>
<tr>
<td>OVER ALL SIGNIFICANCE</td>
<td>.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EFFECT</td>
<td>+ .001</td>
<td>+ .001</td>
<td>- n. s.</td>
</tr>
<tr>
<td>OVER ALL SIGNIFICANCE</td>
<td>.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EFFECT</td>
<td>+ .001</td>
<td>+ .001</td>
<td>.001</td>
</tr>
<tr>
<td>OVER ALL SIGNIFICANCE</td>
<td>.001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

n. s. = Not significant
+ = Positive Differences
- = Negative Differences.
Summary of differences between the achievements of different groups on immediate post-test:

<table>
<thead>
<tr>
<th>GROUPS</th>
<th>Sign. diff.</th>
<th>Non Sign. diff.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>U &gt; A</td>
<td>+3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>U &gt; K</td>
<td>+3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>R &gt; A</td>
<td>+2</td>
<td>-1</td>
<td>3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>8</td>
<td>1</td>
<td>9</td>
</tr>
</tbody>
</table>
6.2.1.2. Summary of effects on the achievements of different groups:

The differences between the groups are given in table No. 6.2 (Page No. 235) and are summarized in table No. 6.3. Table No. 6.3 reveals that group ‘U’ has got 3 significant differences over group ‘A’. Similarly, group ‘U’ has got 3 significant differences over group ‘R’. And group ‘R’ has got 2 significant differences over group ‘A’. Only one is negative that too non-significant.

It clearly reveals that group ‘U’ is definitely superior to group ‘R’ and ‘A’.

Thus these results are in line with our generalization No. 2 which holds that urban group is superior while village group is backward and rural area lies in between the two.
TABLE NO. 6.4

Comparison of differences between three groups in the light of different factors as proposed by P.E. Vernon (1969)

<table>
<thead>
<tr>
<th>SR. NO</th>
<th>CATEGORY</th>
<th>URBAN AREA</th>
<th>RURAL AREA</th>
<th>ADIVASI AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Satisfaction of individual biological need i.e. food, security, hunger and social needs</td>
<td>Satisfied interaction with people, different things, individuals etc.</td>
<td>Less satisfied than Urban area</td>
<td>least satisfied</td>
</tr>
<tr>
<td>2</td>
<td>Perceptual and kinaesthetic experiences, varied stimulus</td>
<td>Interaction with people, things, institutions and ideas is more</td>
<td>Interaction with people, things, institutions and ideas is limited</td>
<td>Interaction with other things is restricted to family or tribal members.</td>
</tr>
<tr>
<td>3</td>
<td>Linguistic stimulation, encouraging formal code and stimulation. According to Bruner Symbolic bedding is more. Opportunities are more</td>
<td>Encouraging linguistic stimulation. Parental interest in their children.</td>
<td>Symbolic bedding is less, opportunities are less</td>
<td>Hence try to express through gestures or actions</td>
</tr>
<tr>
<td>4</td>
<td>Demanding but democratic climate, emphasizing internal controls, responsibilities and interest in education</td>
<td>Demands are more on the part of democratic climate in the house. Parents are very much interested in educating their children.</td>
<td>Less attention on democratic climate. Both parents and children are partially interested in education.</td>
<td>Busy in earning daily bread, no democratic climate.</td>
</tr>
<tr>
<td>5</td>
<td>Conceptual Stimulation by varied environment, books, availability of different electronic equipment such as T.V., radio, V.C.R., tape recorder etc.</td>
<td>Stimulation is more due to limited communication media to the family life.</td>
<td>Stimulation is less due to limited communication media to the family life.</td>
<td>Predominance of foil media.</td>
</tr>
<tr>
<td>SR. NO</td>
<td>CATEGORY</td>
<td>URBAN AREA</td>
<td>RURAL AREA</td>
<td>ADIVASI AREA</td>
</tr>
<tr>
<td>--------</td>
<td>----------</td>
<td>------------</td>
<td>------------</td>
<td>--------------</td>
</tr>
<tr>
<td>6</td>
<td>Absence of Magical beliefs, Absence of Magical beliefs tolerance of non conformity, due to logical thinking, cause and effect relationship</td>
<td>Have Magical beliefs. The atmosphere at home is some what encouraging with this respect, same thing is found in community</td>
<td>Magical beliefs are predominant at both the places, at home and in community.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Reinforcement of linguistic stimulation, family values linguistic stimulation due to family and social environment.</td>
<td>Reinforcement is less.</td>
<td>Reinforcement is the least.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Regular and prolonged schooling &amp; also demanding democratic, emphasizing discovery rather than vote learning.</td>
<td>Parents are interested in educating the children, more attitude of the parents towards the education of the children, no regular schooling. Both the children and teachers are innovative.</td>
<td>Due to somewhat indifferent attitude of both parents &amp; children towards education, do not have feeling for regular schooling and leave the schools in middle.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Appropriate method to overcome language problem through many facilities of learning.</td>
<td>Limited facilities are made available, hence get little opportunity to find appropriate method to overcome language problems. Hence express through actions or gesture.</td>
<td>Least facilities of learning, hence no method to overcome language problem. Hence express through actions or gesture.</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Positive self concept with realistic vocational aspiration.</td>
<td>Parents attitude towards educational of the student. Hence more aspiration in respect.</td>
<td>Farming being main occupation do not feel the need of vocational education. Hence, no question arises with respect to positive self concept with vocational aspiration.</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Broad and deep cultural and other leisure interests.</td>
<td>Due to technological diffusion many means are available to spend leisure, activities have been developed. Urban culture is affecting the behaviour the generations because of new ideas.</td>
<td>Involved in age old traditions. Same type of leisure activity. Old culture is followed from people.</td>
<td>Cultural amplifier</td>
</tr>
</tbody>
</table>
Some of these factors may be co-related to three modes of representation as proposed by Bruner as follows:

1. Enactive mode of representation - No.2 Kinesthetic experiences.

2. Iconic mode of representation - No.2 Perceptual experiences, No.10 positive self concepts with realistic vocational aspiration.

3. Symbolic mode of representation - No.3,7 and 7 linguistic stimulation, No.5 conceptual simulation, No.8 regular and prolonged schooling, No.10 positive self concept with realistic language problem.
6.2.1.2. Differences between the three groups:

Overall results show that the differences between the achievements of the three groups are highly significant at .001 level.

As regards the achievements of the different groups, the achievements of group 'U' are at the highest level and the achievements of group 'A' are at the lowest and the achievements of group 'R' fall in between the two groups.

In order to have proper prospective the nature of the differences in the achievements of the three groups on the immediate post test, it is necessary to take into the consideration the differences between the cognitive development of these groups. With respect to different causative factors: Bruner (1966) chapter II (Page No. 58) gives two causative factors in this respect (1) level of technological growth of the people and (2) the schooling system.

Vernon (1969) has revealed certain environmental factors which relate to the cognitive development of the children (chapter II, Page No. 46). Following table explains how these factors are applicable to these areas viz: Urban, Rural and Adivasi.
The results of the immediate post test, according to our predictions (Page No.233) show that 3 out of 9 differences to be highly significant. It means that the achievements of group 'U' are highly significant to the achievements of group 'R' and 'A', and the achievements of group 'R' are more than the achievements of group 'A'. Thus this result is in line with the generalization No.2.

If these groups are compared from this point of view, we will have to consider the causative factors affecting their achievements.

With respect to the group 'U', it can be said that they get more facilities in all the respects. The table clearly gives the picture that the environment in which group 'U' lives is very much congenial and encouraging which helps to promote learning on the part of the children in this area.

The children have plenty of opportunities to interact with different people, things, institutions, ideas, etc. It provides very rich and varied perceptual and kinesthetic experiences category.

This relates in category No.2 in the Table No.6-4.

The other categories also show that the facilities available in this area are more than that of the other
two areas. The categories No. 3, 7, 9 show that, due to encouraging linguistic stimulus the children can get mastery on their language. The environment in ‘U’ area is rich in symbolic bedding. Due to availability of mass media communication such as radio, T.V., V.C.R., cinema, literature etc., they get knowledge on varied subjects. Hence their mutual repertoire is very rich and fertile. Media exposure directs the children to think independently and in terms of cause and effect relationship.

These children have plenty of facilities to observe models in different fields which motivate them to copy these models leading to the better development of self concept and strong desire for vocationalisation aspiration. In cities there are competitions in every field. Parents are conscious about the education of their children. Tutoring from some other form is available. This creates motivation for the children to learn more and more. Achievement motivation is higher due to these competitions. Hence these children try to learn more and more in any walk of life which is reflected in learning situation. This situation accelerates their learning process leading to higher achievements on their part.
In case of Adivasi group the situation is completely reversed. Media exposure is limited. They have limited scope to interact. Due to this they have less perceptual and kinesthetic experiences.

These children have to face many linguistic problems i.e. categories No.3, 7, 9. They don't get proper guidance to improve their linguistic ability. Hence symbolic hedging is very less this area.

Their parents and some of the personalities in their community are the models for them to copy. Assimilation of knowledge from their parents and near relatives only. Hence low vocational aspiration and formation of poor self concept. They have low achievement motivation which leads to poor achievements.

Parents have to move from place to place for their maintenance. Hence there is negligence on the part of the parents regarding the education of their children. So there is no regular and prolonged schooling.

Mass media in communication is not available in most of these places. Folk media is predominant. They do not get facilities of reading books, watching T.V. or listening to radio. Thus they are not exposed to the new ideas, new problems, new inventions etc., in different fields. Thus due to least media exposure thinking is restricted to their own problems related to their life only. Hence these children do not think independently.
As they cannot think in terms of cause and effect relationship, they have faith in magical beliefs. They stick to their age-old traditions and culture which comes in the way of learning new ideas. (category No.6).

Thus they have uncoordinated which is reflected in their achievements. It leads to retardation of learning process which in turn is reflected in their poor achievements.

Achievements of Rural children are more than that of Adivasi children and less than that of Urban children. They fall midway between the two extremes.

These children come in contact with the people in their area. They also interact with Urban people due to frequent visits in Urban areas. Thus they interact with many people, ideas, and institution etc. But this interaction is less than that of Urban area and more than that of Rural area. Thus due to medium media exposure these children get perceptual and kinesthetic experiences which are more than that of adivasi area and less than that of Urban area (category No.2).

These children also have to face linguistic problems but they have some encouraging stimulation in this respect. They get guidance from their parents and teachers. They also get some opportunities of reading book, watching, T.V., listening to radio, etc. (category No.3,7,9).
Conceptual stimulation is limited as compared to Urban areas. They have folk media predominant but affected by new technique, leading to essential changes in it. This leads to symbolic hedging which is not as much as it is found in Urban still more so than that of Adivasi area.

Main occupation being agriculture, at the time of harvest parents ask the children to work in the fields and to help them in the work. Hence no regular and prolonged schooling. These children rarely get chance to observe models to copy. But being in close contract with the cities, they can hear about these models. Hence self concept though not clearly defined reacts to vocational aspiration to some extent (category No.10).

Media exposure is comparatively less than that of Urban area. But due to frequent contacts with the cities and the availability of mass communication media they get acquainted with the new ideas, innovations, taking place in different fields. This leads to independent thinking an part of the student, but this is affected by the rigidity of the society they live in. Hence they are superstititious. They are trying to overcome the problem of blind faith and magic beliefs. But rigidity nature of the society does not allow them to do so. It is an obstacle in their progress.
Thus due to less congenial environment them Urban area and more congenial environment than adivasi area this group lies between the two groups with respect to their achievements.

Hence Urban group, having well defined logical structure, can assimilate better and can learn more effectively than the rural group which is in transitory stage and which can assimilate and learn. In contrast to these two group adivasi group have got very poorly organized logical structures. Hence their assimilation of knowledge and learning is poorer in both the above mentioned groups.

Thus achievements of mathematical concept by is better urban area, less rural area and the east in adivasi area.

6.2.1.3. Effects of methods on different groups:

It is also important to know which group could do better in which method. For this purpose it is essential to consider each group separately.

If we think of Urban group it is clear that this group can also equally well in all the three methods table no. 6.5. Due to rich environments, these children can learn through any method. Due to varied experience through different media their cognitive development is more. As discussed in the table No. 6.4 these children have many facilities in each category. Hence they could learn equally well in all the three methods.
In case of rural area the children have done better in enactive method than in Ikonic method. (Table No.65 , 66) and symbolic method. But they have done better in symbolic method than in Ikonic method. This result is in contradiction with the generalisation no. one may be due to the chance element. Due to the environmental factors, in this case the children could do better in symbolic method, may be because of rote learning. The students learn the concept by heart without understanding it thoroughly. Hence they could do better in symbolic mode.

In case ofdivasi area Ikonic method was found to be predominant. Which is shows in table no.65 and The children could learn better in Ikonic method. This may be because of less opportunities to take active part in learning through actions on the part of the children. They gain knowledge and store it in Ikonic mode. Hence they could do better in Ikonic mode than the other modes, i.e. enactive and symbolic. Symbolic mode is not properly developed and images are powerful in this area.
Table No. 6.5
Levels of significance for differences between methods on immediate post test:

<table>
<thead>
<tr>
<th>Methods</th>
<th>E → I</th>
<th>E → S</th>
<th>I → S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups</td>
<td>TOTAL EFFECT OVER ALL SIGNIFICANCE</td>
<td>TOTAL EFFECT OVER ALL SIGNIFICANCE</td>
<td>TOTAL EFFECT OVER ALL SIGNIFICANCE</td>
</tr>
<tr>
<td>A</td>
<td>- .001</td>
<td>+ n.s.</td>
<td>0.001</td>
</tr>
<tr>
<td>R</td>
<td>+ .001</td>
<td>+ n.s.</td>
<td>- .03</td>
</tr>
<tr>
<td>U</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

n. s. = Not significant
+ = Positive Differences
- = Negative Differences.
Table No 6.6.

Summary of differences between the effects of methods on immediate post-test:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>E 1</td>
<td>+ 1</td>
<td>- 1</td>
<td>+ 1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>E &gt; S</td>
<td>0</td>
<td>0</td>
<td>+ 5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>g . S</td>
<td>+ 1</td>
<td>- 1</td>
<td>+ 1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>0</td>
<td>9</td>
</tr>
</tbody>
</table>
6.2.1.4. With respect to methods:

The effects of methods on the achievements of different groups.

All the three differences between method E and method S came out to be positive which indicate the trend in favor of method E. In case further replica studies conducted, Enactive mode may come out to be significant to symbolic method.

In case of method I it can be said that only at one place the difference is significant, means, Enactive method is significant to iconic method only in case of one group. But in other two areas iconic method shows its superiority. In one group the differences are negative which shows that the method I is more significant than method E.

But at one place the differences between method E and I are not significant, but the differences are positive. It can be said that in this case iconic method is superior than Enactive method.

Even in if compared with method S iconic method proves more effective than S method. In one group the difference between iconic method and symbolic method is positive, significant. In one group it is not significant but the differences are positive. In this
case it can be said that this difference may become significant if the same experimentation is carried out on other groups. It clearly indicates that ikonic method is more powerful than symbolic mode.

Hence when compared with the two methods, i.e. enactive and symbolic, ikonic method seems to be more powerful. It may be because Ikonic mode is predominant. The reason for this is there is less interaction between action and environment. They have certain linguistics difficulties children obtain and store knowledge in the from of images i.e. ikonic mode. Naturally they are more efficient in expressing the knowledge through ikonic mode.

Thus to sum up:

Out of 9 differences between the methods shown in the table no.6, differences are positive difference (out of which two came out to be significant) are in favor of the trend in favor of E·I·S and hence the generalization No.1 is substantiated.

The result can be analyzed with respect to the effect of each method on the achievements of different group as given below-

We have already seen that all the methods are equally effective when all the groups are taken together. It is also necessary to find the effect of each method on the achievement of different groups.
If we take into account Enactive method it is found that Urban group has done better than the other two groups and rural area has done better than adivasi group which is exposed in Table No. 6.2 and 6.3.

In Urban areas due to congenial environment there is a good deal of interaction with persons, things, institution etc. Hence the students are more actively involved in games, work, activities etc. Thus they have enactive skill which leads to better achievements in enactive mode.

Such facilities are not available to rural area to a desirable extent. Hence the students are less actively involved in different activities such as games, work which provide enactive skill. Thus they lag behind in the achievements with respect to that of Urban areas in this mode.

In case of adivasi areas the facilities and chances of getting the experiences in this respect are very rare and the student lag much behind their brothers in other areas with respect to the achievements.

When the effect of ikonic mode is taken into consideration it is found that urban group has shown better achievements that the achievement of rural and adivasi groups. Adivasi group has done better than that of rural group (Table no. 6.5 and 6.6)
In urban area the environment is rich to provide sthonic experiences due to media exposure. Hence the students could do better in this mode.

On the other hand in rural areas the environment is less congenial to provide sthonic experiences due to limited media exposure which leads to poor achievements in this respect as compared to urban area.

Achievement of adivasi group in this case is more than that of rural group, that is not in consonant with our generalization. It may be attributed to chance element.

With respect to symbolic mode it was found that urban group has done better than both the groups, i.e., rural and adivasi. Rural group has done better than adivasi group.

In case of urban groups it is found that symbolic bedding is more due to more stimulus in learning. They have rich literature, different media, different means of communications which help them to interact with different people, things, ideas, institutions etc. This helps the children to think independently. Which in turn leads to better understanding of the concept. They have more symbolic bedding, hence the children in this area showed better achievements.
But rural children do not have such a congenial environment. They get facilities of reading books but this facility is restricted due to non-availability of the books. They come in contact with limited personalities. Due to typical traditional environment they can't think independently. Hence symbolic bedding in this case is less. Hence those children could show poorer achievements than that of urban children.

But the achievements of rural children is more than the achievements of adivasi children. It is because the symbols are better formed with these children than those of adivasi children. They have better facilities than the adivasi children. Hence their achievements of these children are better than adivasi children.

The achievements of adivasi children is poorer than both the group i.e. rural and urban. These children are backward in many respect than the other two groups. Symbolic bedding is not found in the environment of these children. They have many linguistic problems due to which they cannot express their thought in proper language.
Thus due to different environmental factors these three groups differ with each other which is reflected in their achievements. All the methods are equally effective in urban areas. Adivasi area can do better in inorganic method and rural area can do better in reactive mode. To conclude there are differences in the achievements of the different cultural groups with respect to the different methods. These differences are due to different stages of development, given by Piaget, the children from different areas belong to.

The urban group has reached the formal operational stage where logical operation are well formed. They can assimilate better and can learn better much effectively symbolic bedding is more in this area which integrates the experience learnt through different modes. Hence this group proved its superiority over the other two groups.

The adivasi group is in concrete operational stage which has got poorly organized logical structures. Assimilation of their knowledge is poor hence learning is poor. Hence they showed poorer achievements than that of both the groups i.e. urban and rural.
Whereas rural group lies between the two extremes. They are in transitory phase where logical structures are being formed. Hence they assimilate and learn to the particular level which is lower than urban group but higher than adivasi group.
6.2.2. Discussion on the achievements of different cultural groups on different mode questions:

Up till now the effects of different stimulus modes, in the form of different methods, of the different groups were discussed.

Now in this part we are going to compare the achievements of the three different groups on response mode questions.

The data are reorganized and the achievements of the students for the different mode question, as explained in section 6.1 on page 217, and were analyzed by using the same ANOVA technique with the use of Scheffe test multiple comparison wherever our overall significance was obtained.

6.2.2.1. Discussion on the achievements of different groups on different mode questions as a whole.

The overall differences between the achievements of different groups are highly significant at .001 level.

The overall picture based on the differences between the achievements of the different groups on different mode questions detailed on table No.6.7 and classified on table No.6.8
Table No. 6.7

Levels of significance for differences between mean scores of the groups (achievements) on different modes on immediate post-test.

<table>
<thead>
<tr>
<th>Groups-</th>
<th>Modes</th>
<th>U - R</th>
<th>U - A</th>
<th>R - A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>Effects</td>
<td>Overall Significance</td>
<td>.001</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>+.001</td>
<td>+.001</td>
<td>+.001</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Effects</td>
<td>Overall Significance</td>
<td>.001</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>+.001</td>
<td>+.001</td>
<td>+.001</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>+.001</td>
<td>+.001</td>
<td>+.001</td>
<td></td>
</tr>
</tbody>
</table>

* = Positive
Table No 6.1.

Summary of differences between the achievements of different groups on different modes on immediate post-test:

<table>
<thead>
<tr>
<th>GROUP</th>
<th>+ diff</th>
<th>- diff</th>
<th>+ diff</th>
<th>- diff</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>U : A</td>
<td>+3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>U : R</td>
<td>+3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>R : A</td>
<td>+3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
</tbody>
</table>
Table No.64 tells us that all the six differences related to urban group are highly significant and prove its superiority over rural and adivasi groups.

There are three differences between rural and adivasi groups. All these three differences are in favor of rural groups proving its superiority over adivasi groups.

Thus there result are in favor of the generalization No.2 which suggest that the achievements of the urban groups is highly significant over the achievements of both the groups i.e. rural and adivasi. Rural groups shows better achievements than that of adivasi group.

These differences may be attributed to the differences related to the characteristics of the different groups regarding the factors such as congenial environment, Symbolic bedding, media exposure rich interaction with the environment have been already discussed in part A of this section on page 247 while discussing the effects of different methods.

The results are discussed above with respect to all the groups taken as a whole, in each group taken separately with respect to the expressions on different modes they are discussed in the following manner.
With respect to urban group symbolic mode was found to be predominant with respect to the expressions through different modes. Rural groups have shown better achievement through iconic mode. Where as Adivasi group expressed better through iconic mode.

These differences could be related as well to the discussion made in part 6.2.1. of this section on page No. 253.

6.2.2. Differences of on different mode question with respect to the achievements of different groups.

The overall achievement on different mode question is significant.

This overall picture on the differences on different mode questions detailed on table No.6.9and classified on table No.6.10.

The table No.6.10 shows that in case of enactive mode questions and of six differences only two differences are favorable. One difference is significant over iconic mode but positive. But one difference with respect to iconic mode question is significant but negative. Which prove that expression through iconic mode is more significant than expression through enactive mode. One difference is also non-significant and negative with respect to the symbolic mode questions.
Table No. 6.9

Levels of significance for differences between the modes on immediate post-test.

<table>
<thead>
<tr>
<th>Methods</th>
<th>E × 1</th>
<th>E × S</th>
<th>Total Effects</th>
<th>Overall significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td></td>
<td></td>
<td>- .001</td>
<td>+ n.s.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+ .001</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

+ = Positive differences.

- = Negative differences.
n.s. = Non significant
Table No. 6.10

Summary of differences between the achievements on different modes on immediate post-test.

<table>
<thead>
<tr>
<th>METHODS</th>
<th>Signi.</th>
<th>Non</th>
<th>Non</th>
<th>Non</th>
<th>Non</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+ diff.</td>
<td>diff.</td>
<td>diff.</td>
<td>diff.</td>
<td>diff.</td>
</tr>
</tbody>
</table>

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>1</td>
<td>0</td>
<td>-1</td>
<td>+1</td>
<td>-1</td>
</tr>
<tr>
<td>E</td>
<td>8</td>
<td>+1</td>
<td>-1</td>
<td>0</td>
<td>-1</td>
</tr>
<tr>
<td>L</td>
<td>5</td>
<td>+2</td>
<td>-1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>total</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>
In case of ikonic mode question and of six differences four differences one in favor of this mode question. Out of these four, three are significant. One difference is significant over enactive mode question as discussed in the paragraph given above. Two differences are significant over symbolic mode question. One difference is non-significant but negative in case of E-I. The negative sign indicates that expression on ikonic mode questions one more than that of enactive mode expression.

In case of symbolic mode out of six differences two differences are favorable. One difference is significant over ikonic mode and one difference is significant over enactive mode. At both the places negative sign for significance level shows that expressions through symbolic mode are greater than those through enactive and ikonic mode respectively.

From this result it is shown that ikonic mode is predominant with respect to the achievements expressed through different modes. It is because the students gain their knowledge through images and store it in the same form and at the end express it through the same form i.e. through ikonic mode.
The results are contrary to the generalization No. 1 (Page 233) i.e. E I : S; which was made with respect to the effects of different methods on the achievements of the students from different cultural groups. But this result is concerned with the expression of the students from different cultural groups through different modes of representation.

In the above paragraph the results are discussed with respect to the achievements on different mode questions as a whole. Further analysis on each mode questions related to different modes is done in the following paragraph.

Table No.6:9 shows that the achievements of the students belonging to different groups on enactive mode questions differ significantly. The achievements of urban groups are more than that of rural and adivasi group whereas the achievements of rural groups are more than that of adivasi group.

These differences are because of the different enactive experiences they get due to the different characteristics of these groups as indicated in table No. 6:4 and discussed in part 6.2.1 of this section on page 238.
From table No. 68 it is clear that the responses of urban group are more than that of rural groups which in turn shows better performances than adivasi group on iconic mode questions.

Urban group has proved its superiority over other two groups in this respect. It is due to the iconic experiences these students get due to more media exposure. The congenial experiences in this area helps the students to build images in their mind in such a way that they can assimilate the knowledge properly in this mode and at the end can express it through this mode effectively.

But in case of adivasi area such iconic experiences are limited due to non-congenial environment. Thus these students cannot assimilate their knowledge in terms of images which in turn keeps them behind with respect to express themselves in the same form.

In case of rural groups due to limited media exposure iconic experiences are less as compared to urban group and more as compared to adivasi groups. It results in the assimilation of knowledge which is less than urban groups and more than adivasi group. Hence their performances on this mode questions are more than that of adivasi groups and less than that of urban groups.
From the Table No. 6.8 it is clear that the urban group has expressed better than that of rural groups and adivasi groups through symbolic mode. Whereas rural group has proved its superiority over adivasi group in this respect. These differences are due to symbolic bedding which is more in urban group less in rural group and the least in adivasi group. These factors of linguistic abilities and symbolic bedding have been discussed in section 6.2.1 on page 254.

Overall picture emerging out of this result is the same to that of group differences of part 6.2.1, showing superiority of urban group over the other two groups and superiority of the rural group over adivasi group.
6.2.3. Discussion of Results with respect to the effects of different methods on the achievements of different groups on the delayed post test:

The first two parts of this discussion dealt with the results on the immediate post test. This part aims at finding out the effects of different methods on the retention of the students.

Table No. 6.11

Levels of significance for differences between groups on delayed post-test.

<table>
<thead>
<tr>
<th>Groups →</th>
<th>U · A</th>
<th>U · R</th>
<th>R · A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>U</td>
<td>+ n.s.</td>
<td>+ n.s.</td>
</tr>
<tr>
<td></td>
<td>I</td>
<td>+ 0.001</td>
<td>+ 0.001</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>+ 0.001</td>
<td>+ 0.001</td>
</tr>
</tbody>
</table>

n.s. = Non-significant
- = Negative differences
+ = Positive differences
Table No. 6.12

Summary of differences between the achievements of different groups on delayed post-test.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>U-A</td>
<td>+1</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>U-H</td>
<td>+1</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>H-G</td>
<td>+1</td>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

(270)
6.2.3.1. Effects on the achievements of different groups:

The overall picture based on differences between the effects of three methods on the achievements of the different groups. On delayed post test detailed on table No.6.11 (page 269), one classified in table No.6.12.

It is clearly seen in this case all of six differences all the are in favor of Urban group. And all the differences are significant when compared with adivasi group, and at one place the differences are significant when compared with adivasi group and at one place the differences are causitively non-significant when compared with rural group. Thus this group proves its superiority over the other two groups.

Four differences are non-significant but positive showing favorable trend in this respect.

In case of rural group only one difference is positively significant over adivasi groups and at one place the differences are non-significant and negative which proves that adivasi group is superior to rural group.
Again, this result is in line with the generalization No. 2 (page 233), where ‘U’ group is superior to the other two groups vi: ‘R’ and ‘A’, R > A. In case of rural groups though the group ‘R’ superior over group ‘A’ at other place the differences are not significant and negative which show the trend in favor of Adivasi group it many turn to be positive and significant in the replica of this study. Hence the group ‘R’ can be superior to the group ‘A’ with respect to the relation of knowledge.

This result is in line with the generalization No. 2 (page 233) which states that U : R : A. As this is a delayed post test, it indicates the retention on the part of the students in mathematical concept.

These differences prove that urban children have got better memory storage and better retention as compared to the groups of adivasi and rural children. This better memory storage may be attributed to more rich input consisting of varied experiences through three different modes which is already explained on page no.253 section 6.2.1.

6.2.1.4. This result is discussed on the achievements of different groups on different methods on the delayed post test taken as a whole. Further analyses on the achievements of each group on different methods is as follow.
From this point of view it is found out from table no.6 that the urban group has achieved equally well as there are no significant differences between the means of different methods. It clearly states that this group can show equally better retention in all the three methods.

The knowledge gained is retained with equal efficiency through different methods taken separately as explained above.

This is due to the rich, congenial and favorable environment, as it is already discussed in section 6.2.1. on page No.253, the student could show equal retention in all the methods.

In case of rural group the achievements in enactive method are better than that of iconic method and symbolic method. Even they have done considerably better in symbolic mode than in iconic mode. Thus this group shows better retention in enactive method.

They could not show better achievements in iconic mode may be due to the habit of rote learning on the part of the students. It is also due to the experiences they got in enactive mode is more due to the environment they live in, thus is already discussed in section 6.2.1. on page No.253.
In case of adivasi group iconic method seems to be more predominant. The student have shown better reaction in iconic method than symbolic and enactive method. This result is similar to that of the result of immediate post test. This may be because the students are very much acquainted to learn the concept in this method. They gain and store the knowledge in iconic mode. Hence they can show better retention in iconic mode.

Thus with respect to the retention of different groups is at different level. In urban group it is at higher level because this group, because according to Piaget, has reached formal operational stage where logical structures are well formed. Hence assimilation is more which leads to better retention.

In case of adivasi group which belongs to concrete operational stage where logical structures are not formed properly due to which assimilation is not done properly. Hence retention is at lower level.

In case of rural group which is in transitory phase logical structures are being formed which helps them to accumulate the knowledge to a certain extent. Hence retention is at the medium level.
Table No. 6.13

Levels of significance for differences between the methods on delayed post-test.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Methods</th>
<th>L : I</th>
<th>L : S</th>
<th>I : S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Effects - Overall significance</td>
<td>0.001</td>
<td>+ .05</td>
<td>+ .001</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>- n.s.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Effects - Overall significance</td>
<td>0.1</td>
<td>+ n.s.</td>
<td>- n.s.</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>+ 0.10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Effects - Overall significance</td>
<td>n. s.</td>
<td>+ n.s.</td>
<td>+ n.s.</td>
<td>- n.s.</td>
</tr>
<tr>
<td>U</td>
<td>+ n.s.</td>
<td>+ n.s.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

+ = Positive differences.
- = Negative differences.
n.s. = Non significant
Table No. 6.14

Summary of differences between the effects of methods on delayed post-test.

<table>
<thead>
<tr>
<th>METHOD</th>
<th>Signi.</th>
<th>Non</th>
<th>Signi.</th>
<th>Non</th>
<th>Signi.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>diff.</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>E &gt; I</td>
<td>+1</td>
<td>0</td>
<td>+1</td>
<td>-1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>E &gt; S</td>
<td>+1</td>
<td>0</td>
<td>+2</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>I &gt; S</td>
<td>+1</td>
<td>0</td>
<td>+1</td>
<td>-1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>
6.2.3.2. Detailed discussion with respect to the effects of different methods on delayed post test:

The overall differences show that the differences between the mean scores on different methods are not significant at any level.

This shows that all the methods are equally effective in all the three groups. The students can do equally well in all the three methods even delayed post-test which was administered a month later after the conduct of field trials.

If these differences are studied in detail with respect to each method the overall result detailed on the table No. 6.13 and classified on the table No. 6.14.

From table No. 6.14, it is clear that out of 6 differences with respect to enactive method five differences are in favor of it. One difference is significant over iconic method. One difference is not significant but positive showing favorable trend in this respect. One difference is significant over symbolic method. But in the same category two differences are non-significant positive being favorable in this respect.
In case of Iconic method out of six differences one is significant over symbolic method. There is one difference non-significant but negative, when E-I is compared which proves that Iconic method is more effective in this case.

With respect to symbolic method, only one difference is in favor of this method. It is shown while comparing with Iconic method. When J-S is done the differences are non-significant but negative which proves that symbolic method is more effective than Iconic method.

Thus the result proves that the students can retain better in enactive method than Iconic method, which is predominant over symbolic method. This is line with our generalization No. 1 section 6.2. (Page 233) i.e. E-J > S.

If each method has to be considered separately to do detail analysis of this part the effects of each method will be realised.

In case of enactive method it is found that the differences between the mean scores of different groups are not significant at any level. Which proves that the students belonging to different areas can do equally
well in this method. It shows that the students can store the knowledge better if they are taught through this method. They can retain their knowledge well in the form of action.

If the results of symbolic method are considered it is found that urban group proves its superiority over the other two groups i.e. rural and adivasi group, and rural group proves its superiority over adivasi group in this respect.

The superiority of urban group is due to many factors, due to more congenial environment and rich symbolic bedding as explained on page section 6.2.1. more in this area. The students can gain and store their knowledge properly. They can comprehend better and hence retention on the part of the students is found more in this area.

In case of rural group they have less congenial environment (table No.6.4). They have less symbolic bedding than that of urban area. The comprehension is less hence retention is less as compared to urban area.

As compared with the above two groups adivasi group have discouraging and non congenial environment which leads to less retention in this respect.
In case of iconic method it was found that urban area can do better than both the two areas in this method. But adivasi group has done better than rural group with this respect.

In case of urban area due to more congenial environment discussed in the earlier table No. the students can store the knowledge very well, hence their retention is more which results in better retention.

But in case of rural and adivasi area due to the less congenial factors as discussed in the table No.64 (Page No.238), the retention of these students are less in this method.

But the retention of the adivasi group in this area is nearly equal rather more in relation to the retention of rural group.

This may be due to the practice effect on the part of the students. The students are used to gain the knowledge in this method and they can store it well in the same mode of representation which is reflected in their response on the delayed post test.