* SUMMARY

and

OBSERVATIONS
CHAPTER NO.XIV
SUMMARY AND OBSERVATIONS

1. The present test is based on a definition of 'Aptitude' as given by W.V. Bingham -

"Aptitude is a condition symptomatic of a person's relative fitness, of which one essential aspect is his readiness to acquire proficiency - his potential ability - and another is his readiness to develop an interest in exercising that ability."

2. It is designed to measure the aptitude of pupils at the end of the Secondary Stage of education.

3. The test is aimed to be used as a tool by the concerned authorities for the science course at the collegiate level.

4. The test contains five different sub-tests measuring the following five components of aptitude for science:

(a) Science information
(b) Scientific comprehension
(c) Space relation
(d) Numerical ability
(e) Mechanical comprehension.
5. The number of items in each sub-test is as under:

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Sub-test</th>
<th>No. of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Science information</td>
<td>20</td>
</tr>
<tr>
<td>2.</td>
<td>Scientific comprehension</td>
<td>30</td>
</tr>
<tr>
<td>3.</td>
<td>Mechanical comprehension</td>
<td>13</td>
</tr>
<tr>
<td>4.</td>
<td>Space relation</td>
<td>12</td>
</tr>
<tr>
<td>5.</td>
<td>Numerical ability</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

6. The test is composed of items which are prevalidated before being included in the test.

7. An external criterion score has been obtained based upon ratings by experienced teachers and achievement in science by pupils. Teachers' ratings are based on the participation by pupils in Science club activities.

8. The internal consistency and item difficulty data have been obtained on a tryout of the test on a sample of 370 pupils.

9. The test has been standardized on a sample of 1218 pupils selected from all over Gujarat. The sample selected for standardization is stratified and random.
10. The reliability of the test has been determined by four different methods. The maximum reliability obtained is .92 by test-retest method and the minimum is .89 by analysis of variance technique.

11. The validity of the test has been found against the marks obtained at the pre-university examination. A cross-validation study is also made.

12. Factor analysis of the test has been done on a modest scale. The factor analysis results show the existence of one single factor in the test.

SOME OBSERVATIONS:

1. Science Aptitude & Population:

   The distribution of test scores yields the familiar normal curve. This shows that like intelligence and similar other mental abilities, aptitude for science is also normally distributed among the population. The group of pupils falling in the upper grade of the distribution curve provides a fertile field to locate science talent at the end of Secondary Education stage.
2. Science Aptitude & Sex Differences:

The analysis of the test scores of boys and girls yields the following results:

<table>
<thead>
<tr>
<th>Sex</th>
<th>N</th>
<th>Mean score</th>
<th>( \sigma )</th>
<th>( \frac{\text{M1-M2}}{\sigma} )</th>
<th>S.E. of ( \frac{\text{M1-M2}}{\sigma} )</th>
<th>C.R.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>931</td>
<td>57.69</td>
<td>14.3</td>
<td>5.25</td>
<td>.99</td>
<td>5.3</td>
</tr>
<tr>
<td>Girls</td>
<td>287</td>
<td>52.44</td>
<td>14.6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This shows that boys as a group have a better aptitude for science than girls taken as a group.

3. Science Aptitude & Rural-urban differences:

The analysis of the test scores of pupils coming from the rural and urban areas is given below:

<table>
<thead>
<tr>
<th>Area</th>
<th>N</th>
<th>Mean score</th>
<th>( \sigma )</th>
<th>( \frac{\text{M1-M2}}{\sigma} )</th>
<th>S.E. of ( \frac{\text{M1-M2}}{\sigma} )</th>
<th>C.R.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>688</td>
<td>55.87</td>
<td>14.6</td>
<td></td>
<td>2.34</td>
<td>.837</td>
</tr>
<tr>
<td>Rural</td>
<td>530</td>
<td>53.53</td>
<td>14.4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This shows that the pupils coming from the urban area have a slightly better aptitude than those from the
rural and the difference is statistically significant. It can, therefore, be said that the rural or the urban educational or the environmental conditions do influence the development of scientific aptitude in the pupil significantly.

4. Predictive value of the Test:

A comparative picture of the correlations between the scores of the pupils on the present test and their performance at the pre-university examination on one hand and on the other hand the correlation of their marks at the S.S.C. Examination and their performance at the pre-university examination marks is given below:

<table>
<thead>
<tr>
<th>Variables</th>
<th>Sample</th>
<th>Correlation 'Z'</th>
<th>Difference</th>
<th>S.E.</th>
<th>C.R.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Test scores and marks at the pre-university examination</td>
<td>100</td>
<td>.76</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Marks in science subjects at the S.S.C. Examination marks at the pre-university examination</td>
<td>100</td>
<td>.39</td>
<td>.41</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[
\begin{array}{c|c|c|c|c}
\text{Variables} & \text{Sample} & \text{Correlation 'Z'} & \text{Difference} & \text{S.E.} & \text{C.R.} \\
\hline
1. Test scores and marks at the pre-university examination & 100 & .76 & 1.00 & & \\
2. Marks in science subjects at the S.S.C. Examination marks at the pre-university examination & 100 & .39 & .41 & & \\
\end{array}
\]
It can be seen from above that the present test is a better predictor of pupils' performance at the Pre-university examination than the S.S.C. Examination marks.

5. Science Aptitude & General Intelligence:

The factorial study shows the existence of one single factor associated with 'Scientific Aptitude' as measured by the present test. It is also observed that this factor is not identical with the 'General Intelligence' as measured by the Test of Intelligence of Dr. K.G. Desai. Hence, it may be suggested that a set of these two tests used together might prove a good predictor of pupils' performance at the collegiate stage.

6. Future Studies:

Future studies on the predictive value of the present test in terms of pupils' performance at the degree examination in science will throw more light on the predictive validity of the present test. It will also be an important study to explore the predictive value by the combined use of the present test and Dr. Desai's Test of Intelligence. These are the two important studies that have emerged from the present work.