## CHAPTER IV

### METHOD AND PROCEDURE

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References
CHAPTER IV

METHOD AND PROCEDURE

4.1 Introduction

The foregoing chapters dealt in detail on testing creativity of children. Many researches pertaining to relevant variables have been examined critically. The present problem of the research deals with creativity of B.C. and N.B.C. students of secondary schools of Baira district in relation to their institutional climate. Research indicate that creative ability is found to be at various levels in different children. The differences arise because of upbringing, parent's education, habitat and socio-economic status of the parents. There are other causative or influencing factors such as school climate and sex of the children.

At first sight the problem of the research seems to be simple. Straight way planning would not be able to control the experimental variance. For having good, clearcut and interpretable reliable conclusions the researcher wants to design the present research. For this to happen, Burroughs gives the basic canons of planning.

According to him:

(1) Maximizing the experimentally induced variance i.e. do everything possible that will ultimately maximize the differences between the means of independent variables like XA, XB, XC.
(ii) Minimizing the error variance, i.e. minimize the variance against which the outcome of the research activity is to be evaluated.

(iii) Controlling systematic extraneous variance, i.e. control those other factors (i.e. other than the factors given in the problem) which might have produced or contributed to the research outcome when the researcher was off his guard.

This variance is the variance present or induced in the dependent variable.

4.2 Basic Tenets of Planning

(i) Maximizing the experimentally induced variance means controlling the extraneous variables which seems to be influencing the dependent variable. The maximization of experimental differences must be secured by fair means and not by foul.

(ii) Minimizing the error variance:

At first sight this would minimize the differences between individual children; to the extent that these are random and unpredictable this is true. The more alike the children are, the same sex, the same I.Q. level, the same S.E.S. level, the smaller will be the error variance, though at the cost of a restriction of the generalizability of the results.
(iii) Controlling the systematic extraneous variance:

(a) The first way of controlling this variance is to eliminate the sources which cause it.

(b) A second method of controlling extraneous sources of variance is deliberately to incorporate them in the experiment so that their effects may be seen and allowed for.

The researcher, therefore, thought it fit to incorporate those variables not mentioned into the wording of the problem, none the less they would increase the variance and would accurately process. Thus it has been planned to incorporate into the design the area of the pupils and sex. It would have been better if it could have been managed to incorporate still more variables. But looking to the length of time and cost restrictions, the design has been limited to four variables.

4.3 The variables of the Research Design

The dependent variable are the creativity scores, while the independent variables are as under below:

(1) Institutional climate will operate at two extremes: One is open climate while the second is closed climate.

(2) Area of the pupils will operate at two levels: One is urban area of the pupils and the other is rural area.
(3) Sex of the pupils will also operate at two levels: Boys and girls.

(4) Caste of the pupils also will operate at two broad categories of the castes, Backward Class pupils (B.C.) and Non Backward Class pupils (N.B.C.).

The area and sex of the pupils have been hypothesized to have impact on creative ability of the pupils. Hence the underlying research design has 2x2x2x2 of factorial nature. Its model score would be presented later on.

4.4 Instruments used

Institutional Climate Description Statements would be used which is prepared and standardized by Dr. Anjani Mehta. The characteristics have been as under.

It is a likert type scale consisting of 91 statements, each statement is to be marked one point out of five points such as:

1) never true
2) hardly true
3) occasionally true
4) often true
5) mostly true

The teacher perceives the school climate and weighs each statement and gives his preference to one of five points.
Dr. Anjani Mehta constructed the scale for her Ph.D. study. The scale was standardized upon two hundred teachers—principals of 12 institutions of different academic streams.

Each statement reflects one of the three behaviours:
- teachers' behaviour
- principals' behaviour
- administrative behaviour

These three behaviours further describe four components such as:

(1) Under teacher behaviour:
   (i) Disengagement
   (ii) Hindrance
   (iii) Esprit
   (iv) Intimacy

(2) Under principal behaviour:
   (i) Aloofness
   (ii) Production Emphasis
   (iii) Thrust
   (iv) Consideration

(3) Under administrative behaviour:
   (i) Organizational structure
   (ii) Human relationships
   (iii) Communication
   (iv) Democratic Decentralization—Freedom
Dr. Anjani Mehta indicated institutional climate in three types:

(i) open climate  
(ii) average climate  
(iii) closed climate  

4.4.1 Methodology of Determining Climates

Climate of the institution has been determined by following the undermentioned procedural steps:

(i) Get the responses of the teachers. The respondents answer on five point scale so the maximum score on the scale would be \(91 \times 5 = 455\) and minimum 91.

(ii) Positive statements have to be scored regularly while negative ones to be scored in a reverse order.

(iii) Get an average score of the respondent on each component of behaviour.

(iv) Add the scores obtained on each component separately and divide by the number of statements pertaining to that component. The dividend shows the average score of the component.

(v) Get averaged score of eight components for each respondent and prepare a table.

(vi) Get average score on each component. Add the average scores of each respondent component
wise. Divide the added sum by number of respondents. The dividend is the average score of the component for that respondent. In a similar fashion, find out average scores for each component of each school and tabulate them.

Institutional Climate Description Statements (ICDS) scale has three main divisions and each division has four components. The number of statements in each component has been shown in the following Table 4.1.
TABLE 4.1

Name of Components of ICDS and No. of Statements in each component

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of Components</th>
<th>No.of State Statements</th>
<th>Sr.No. of the Total Statements</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Teacher's behaviour</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Disengagement</td>
<td>11</td>
<td>14,16,20,21,31,35,56,77,78,83,84</td>
<td>55</td>
</tr>
<tr>
<td>2</td>
<td>Hindrance</td>
<td>5</td>
<td>3,27,38,45,55</td>
<td>25</td>
</tr>
<tr>
<td>3</td>
<td>Esprit</td>
<td>9</td>
<td>17,34,49,53,58,59,67,74,76</td>
<td>45</td>
</tr>
<tr>
<td>4</td>
<td>Intimacy</td>
<td>7</td>
<td>2,5,10,18,37,40,61</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>32</td>
</tr>
<tr>
<td>II</td>
<td>Principal's behaviour</td>
<td></td>
<td></td>
<td>160</td>
</tr>
<tr>
<td>5</td>
<td>Aloofness</td>
<td>5</td>
<td>6,8,13,26,41</td>
<td>25</td>
</tr>
<tr>
<td>6</td>
<td>Production Emphasis</td>
<td>5</td>
<td>52,60,66,68,91</td>
<td>25</td>
</tr>
<tr>
<td>7</td>
<td>Thrust</td>
<td>6</td>
<td>12,19,57,64,69,79</td>
<td>30</td>
</tr>
<tr>
<td>8</td>
<td>Consideration</td>
<td>5</td>
<td>1,36,44,70,85</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>III</td>
<td>Organizational behaviour</td>
<td></td>
<td></td>
<td>185</td>
</tr>
<tr>
<td>9</td>
<td>Organizational structure</td>
<td>8</td>
<td>7,9,13,23,24,29,32,82</td>
<td>40</td>
</tr>
<tr>
<td>10</td>
<td>Human relationship</td>
<td>11</td>
<td>42,45,50,51,62,80,81,87,88,89,90</td>
<td>55</td>
</tr>
<tr>
<td>11</td>
<td>Communication</td>
<td>7</td>
<td>11,25,30,39,43,72,71</td>
<td>35</td>
</tr>
<tr>
<td>12</td>
<td>Decentralized Democratization Freedom</td>
<td>12</td>
<td>4,22,28,33,48,48,54,63,65,73,75,86</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>38</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td>455</td>
</tr>
</tbody>
</table>

N.B.: Underlined statements are negative. They need to be scored in reverse order.
4.4.2 Institutional Climate and ICDS

In a major study of 60 schools, Helpin and Croft identified and described eight basic characteristics of social interaction between the principal and teachers. Like Dr. Anjani Mehta's concept of Institutional Climate, their concept was similar and can be juxtaposed with each other.

Four characteristics refer to teacher behaviour: Disengagement, Hindrance, Esprit and Intimacy and four describe principal's behaviour: Aloofness, Production Emphasis, Thrust and Consideration.

In a similar fashion of Organizational climate Description Questionnaire runs Institutional climate Description Statements with one exception, the six openness factors can be computed by summing up the Esprit and Thrust (3+7) and then subtracting the Disengagement (1) scores. Dr. Anjani Mehta's method of determining weightage for all components and then these weightage are used in demarcating three climates.

The researcher was in two minds, whether to follow Dr. Anjani Mehta's scoring and categorizing method or to devise a new method. Moreover the instrument is now used on different population of different district. The opinion from experts revealed that in order to use ICDS and its scoring and categorizing method, the researcher has to remain satisfied with only raw scores obtained from the sub
samples of the district. The standard scores derived by the author of ICDQ were not used because
1) the original sample was different than the research sample used here.
2) Moreover the procedure of transforming the raw scores into standard scores was cumbersome.
Here it was contemplated to use raw scores. But these would increase variability. Therefore percentile norms of the raw scores were used. Further instead of devising the standardizing norms or else, he could go straight away analyzing the raw scores and interpret the data obtained.

The researcher was given the example by the statisticians of repute that Vijaya Kanan Ayer\textsuperscript{2} has got her Ph.D. from S.P.University before a few years. She used OCDQ but she was advised in the similar fashion to analyze the raw scores.

Before administering to the samples of the institutions of the Kaira district, the researcher established the reliability of ICDS by test-retest method. The interval between the two administration was kept 25 days. The coefficient of reliability was found to be 0.698 which was taken as adequate.

4.4.3 Passi Tests of Creativity (P.T.C.)

The second instrument used by the researcher for collecting data is P.T.C. P.T.C. are developed
for the purpose of measuring creativity in school children. In all, six tests namely (i) seeing Problem Test (ii) The Unusual Uses Test (iii) The Consequences Test (iv) The Test of Inquisitiveness (v) The Square Puzzle Test and (vi) The Block Test of Creativity are included in the test battery. These tests are classified on the tunes of Torrance, as follows:

(a) Tests consisting of verbal tasks, namely the seeing problem test, the unusual uses test and the consequences test.

(b) Test with verbal response tasks using mostly non-verbal stimuli, namely, the test of Inquisitiveness.

(c) Test consisting of non-verbal tasks comprising the square puzzle test and Block Test of Creativity.

The nature of the tests of creativity permitted freedom of responses both qualitative and quantitative within specified time-limits, thus ensuring suitability of the tools for measuring divergent thinking. Instructions and practice items are provided before the actual commencement of the administration of the different tests. The subjects are supposed to write their responses in the answerbooks provided for the purpose. All the tests are available both in Hindi and English. The Hindi
language used in the test items was so easy that it was not required to be translated into Gujarati language. A brief description is given in the following paragraphs.

(1) **The Seeing Problems Test**

It is a verbal, individual and group test. The test is developed by adopting patterns followed by Guilford. It is designed to measure a factor of sensitivity to problems which is a component dimension of creativity as described by Guilford. This is purposed to measure the ability to comprehend problems concerning the working of simple and hardy articles of common use. The test includes four items viz. shoes, pen, chair and postcard. The maximum time limit is kept eight minutes. Instructions are given in the manual.

(ii) **The Unusual Uses Test**

It is a verbal and individual and group administration test. It is designed on the lines of the Brick Uses Test by Guilford and Torrance. The test includes the names of things which could be used for numerous purposes. The test includes the names of things which have prosperity with the psychological and physical environment of the
subjects. It has two items, viz. piece of cloth and bottle. The subjects are asked to write down as many interesting and unusual responses to each stimulus article as they can. The maximum time limit is eight minutes. Instructions are given in the manual.

(iii) The Consequences Test

It is a verbal and individual and group administered test. Its pattern is based on the test of Guilford and Torrance. The test measure the dimensions of fluency, originality and creativity. The creativity score is the sum of scores of fluency and originality. The test includes four items viz.; "If humanbeings start flying like birds...", "If all houses start flying...", "If all the people become mad..." and "If all females become males...". The maximum time limit is eight minutes. The instructions are given in the manual.

(iv) The Test of Inquisitiveness

It is a verbal and an individual and group administered test. In order to provide an unfamiliar and novel situation, the test includes a relatively less familiar thing providing sound and movement as the test contains a metronome. In order to provide a situation for greater inquisitiveness, a
playcard bearing in capital letters "A FEW CHILDREN CANNOT TOUCH IT", is displayed along with metronome in working condition.

The subjects are expected to imagine and write as many questions as possible within six minutes. The test, thus presents the non-verbal stimuli but the responses are to be accepted in writing. Instructions to this effect are given in the manual.

(v) The Square Puzzle Test

It is a non-verbal and individually administered test. The rationale for including the dimension of persistency in creativity was, firstly based on the comments made by Eysenck about the significance of persistency for the effective use of persons ability. The success or failure of individuals depends largely on the ability to endure and continue to strive for the sake of achievement inspite of fatigue and discouragement.

The square puzzle test consists of five identical right angled triangles and five identical quadrilaterals made up of plastic. The subject has to construct a square by using all ten given plastic pieces without leaving any gap for overlay in between the pieces.
The square of persistency is considered as the time taken in complete minutes on the task. Instructions to this effect are given in manual.

(vi) **The Block Test of Creativity**

It is a non-verbal and an individually administered test. It is a performance test and it is administered individually. The test follows the pattern of the Lowenfield Mosaic Test of LMT.

It consists 19 identical cubes of 1"x1"x1" and 12 diagonally cut semicubes. The material provided two types of blocks and three types of surfaces viz. squares, rectangles and right angled triangles. The six surfaces of the cubes are painted in red (top), blue (bottom), yellow (face), green (back), white (leftside), black (right side). The 12 diagonally cut semicubes have in all 24 right angled triangular surfaces, 24 squared surfaces and 12 rectangular surfaces. The 12 semi-cubes are so cut that the four triangular faces of each colour can be obtained. In this way the test material is employed a colour scheme consisting of seven different colours. The subjects have the option of using two types of blocks, three types of surface and
seven types of colour in different combinations simultaneously. Besides this, a 10"x10" wooden board covered with white paper is also provided to be used as a base for assembling the blocks to make designs or structures.

The subjects have to produce as many interesting and unusual designs as can be possible in ten minutes.

The scores of fluency, flexibility, originality and creativity are proposed to be scored from the designs and structures developed by the pupils. Creativity scores is the sum of the scores of fluency, flexibility, originality. The instructions are given in the manual.

4.4.4 Scoring of P.T.C.

The responses of the six tests of P.T.C. are of divergent nature. So it is not possible to employ ordinary stencil scoring system as the content and nature of responses are not known in advance consequently, for each tool of measurement, a separate system of scoring had to be devised with the help of the panel of judges comprising eleven post graduate students of the Department of Education. They were asked to give their opinion about relevance
and categorization of responses and in case of conflicts, discussion with the judges held in order to take a final discussion.

The detailed scoring for procedure in each test is given in the separate booklet namely "Scoring Key for P.T.C.". So it is not advisable to make copy from it.

Passi Test of creativity has been evolved on the sample which is outside Gujarat region. Therefore the standard scores calculated on the performances of far off region cannot be taken as model on the present research on the pupils of Kheda district. Hence the safer way would be to base the research on the raw scores on Passi test of creativity. This would give a clear and accurate picture of the present status of creativity of the pupils of Kheda district. To add more weight and accuracy and to have more precision into the research, the investigator used Percentile norms of the raw scores which are standard scores in themselves.
### TABLE - 4.2
Probable sample profile for the area schools of the sample schools

<table>
<thead>
<tr>
<th>Taluka</th>
<th>Rural Schools</th>
<th>Urban Schools</th>
<th>Total Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Anand</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>2. Balasinor</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>3. Borsad</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>4. Kapadvanj</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5. Khambat</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>6. Mahemdabad</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>7. Matar</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>8. Nadiad</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>9. Petlad</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>10. Thasara</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Rural/Urban Schools</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Total Schools</td>
<td>80</td>
<td>80</td>
</tr>
</tbody>
</table>

### TABLE - 4.3
Probable sample profile for the secondary school students of the sample schools

<table>
<thead>
<tr>
<th>Standard</th>
<th>Rural Boys</th>
<th>Rural Girls</th>
<th>Urban Boys</th>
<th>Urban Girls</th>
<th>BC/NBC Boys</th>
<th>BC/NBC Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>9</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>10</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>BC/NBC</td>
<td>360</td>
<td>360</td>
<td>360</td>
<td>360</td>
<td>360</td>
<td>360</td>
</tr>
<tr>
<td>Boys/Girls</td>
<td>720</td>
<td>720</td>
<td>720</td>
<td>720</td>
<td>720</td>
<td>720</td>
</tr>
<tr>
<td>Rural/Urban</td>
<td>1440</td>
<td>1440</td>
<td>1440</td>
<td>1440</td>
<td>1440</td>
<td>1440</td>
</tr>
<tr>
<td>Total</td>
<td>2880</td>
<td>2880</td>
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<td>2880</td>
<td>2880</td>
<td>2880</td>
</tr>
</tbody>
</table>
4.5 **Sample and Collection of Data**

Kaira district consists of 10 talukas. From each taluka four schools were selected from each rural and urban area, thus forming the school sample of $10 \times 4 \times 2 = 80$ schools. From each school 12 pupils, 3 B.C. boys, 3 Non B.C. boys, 3 B.C. girls and 3 Non B.C. girls were selected on the basis of their academic achievement.

The schools were selected randomly and the pupils were also randomized. Initially 960 students were selected randomly from each standards of VIII, IX and X. Therefore the total for all the three standards were $960 \times 3 = 2880$. These were categorized into low, average and high achievers in total examinations.

For collecting the scores on ICDS instruments 40 rural schools and 40 urban schools were selected, four schools from each taluka areawise. From each school 5 teachers including the headmaster were randomly chosen. Thus 400 teachers were administered, Dr. Anjani Mehta’s ICDS instrument. The questionnaire was scored according to the instruction of the author of the instrument and openness factor score for each school was obtained.

Then the schools were classified into two categories open and closed climate schools according to the procedure laid down earlier.
The P.T.C. tests were administered to 2880 students and the answer sheets were scored and analyzed. Of 576 students who were randomly selected from open and closed climate schools.

4.6 **Formulation of Null hypotheses of first phase of whole creativity score**

The study has four independent variables. Hence the four null hypotheses and other interactive hypotheses were formulated as under:

1. There is no significant mean difference between the pupils of open and closed climate schools in respect of the whole creativity score.
2. There is no significant mean difference between the pupils of rural and urban areas in respect of the whole creativity score.
3. There is no significant mean difference between the pupils of both the sexes in respect of the whole creativity score.
4. There is no significant mean difference between the pupils of B.C. and Non B.C. in respect of the whole creativity score.
5. There is no significant interaction between/among the independent variables viz. climate, area, sex and caste in the production of the whole creativity score.

The last null hypothesis is comprised of various hypotheses concerning first, second, third and fourth order interactions in general.
4.6.1 **Formulation of Null Hypotheses concerning various sub-tests**

The study has the following null hypotheses. The dependent variable is creativity scores which has been split into six subtests. The researcher wants to know the influence of the independent variable for each of the separate subtests. Hence each of the null hypotheses will be split into six sub hypotheses under one heading. Thus,

1. There is no significant mean difference between the pupils of open and closed climate schools in respect of
   
   (i) the Mean Percentile Scores (MPSS) of (I) Seeing Problem (S.P.) of Creativity Test
   
   (ii) the MPSS of (II) Unusual Uses (UU) of Creativity Test
   
   (iii) the MPSS of (III) Consequences (C) of Creativity Test
   
   (iv) the MPSS of (IV) Inquisitiveness (I) of Creativity Test
   
   (v) the MPSS of (V) Persistency (P) of Creativity Test
   
   (vi) the MPSS of (VI) Block Test (B.T.) of Creativity Test
(2) There is no significant mean difference between the pupils of rural and urban areas in respect of

(i) the MPSS of Seeing Problem (S.P.)
of Creativity Test

(ii) the MPSS of Unusual Uses (U.U.)
of Creativity Test

(iii) the MPSS of Consequences (C)
of Creativity Test

(iv) the MPSS of Inquisitiveness (I)
of Creativity Test

(v) the MPSS of Persistency (P)
of Creativity Test

(vi) the MPSS of Block Test (B.T.)
of Creativity Test

(3) There is no significant mean difference between the both sexes of the pupils in respect of

(i) the MPSS of Seeing Problem (S.P.)
of Creativity Test

(ii) the MPSS of Unusual Uses (U.U.)
of Creativity Test

(iii) the MPSS of Consequences (C)
of Creativity Test

(iv) the MPSS of Inquisitiveness (I)
of Creativity Test
(v) the MPSS of Persistency (P) of Creativity Test

(vi) the MPSS of Block Test (BT) of Creativity Test

(4) There is no significant mean difference between the B.C. and Non B.C. (N.B.C.) pupils in respect of

(i) the MPSS of Seeing Problem (S.P.) of Creativity Test

(ii) the MPSS of Unusing Uses (UU) of Creativity Test

(iii) the MPSS of Consequences (C) of Creativity Test

(iv) the MPSS of Inquisitiveness (I) of Creativity Test

(v) the MPSS of Persistency (P) of Creativity Test

(vi) the MPSS of Block Test (BT) of Creativity Test

(5) There is no significance first order interaction between the independent variables of climate, area, sex and caste of the production of

(i) the MPSS of Seeing Problem (S.P.) of Creativity Test

(ii) the MPSS of Unusual Uses (UU) of Creativity Test
(iii) the MPSS of III Consequences (C) of Creativity Test
(iv) the MPSS of IV Inquisitiveness (I) of Creativity Test
(v) the MPSS of V Persistency (P) of Creativity Test
(vi) the MPSS of VI Block Test (BT) of Creativity Test

(6) There is no significant interactions between the independent variables viz. climate, area, sex and caste in the production of

(i) the MPSS of I Seeing Problem (S.P.) of Creativity Test
(ii) the MPSS of II Unusual Uses (UU) of Creativity Test
(iii) the MPSS of III Consequences (C) of Creativity Test
(iv) the MPSS of IV Inquisitiveness (I) of Creativity Test
(v) the MPSS of V Persistency (P) of Creativity Test
(vi) the MPSS of VI Block Test (BT) of Creativity Test

There are altogether 4 second order interactions.
There is no significant third order interaction among the variables viz. climate, area, sex and caste in the production of

(i) the MPSS of I Seeing Problem (S.P.)

of Creativity Test

(ii) the MPSS of II Unusual Uses (UU)

of Creativity Test

(iii) the MPSS of III Consequences (C)

of Creativity Test

(iv) the MPSS of IV Inquisitiveness (I)

of Creativity Test

(v) the MPSS of V Persistency (P)

of Creativity Test

(vi) the MPSS of VI Block Test (BT)

of Creativity Test

There is only one third order interaction in this case.

The overall null hypotheses to be tested would be

Main effects $4 \times 6 = 24$

First Order Interactions $6 \times 6 = 36$

Second Order Interactions $4 \times 6 = 24$

Third Order Interactions $1 \times 6 = 6$

$15 \times 6 = 90$

The above matter is reflected in the tabular form in Table 4.4.
TABLE - 4.4

Variables and their hypotheses in the six subtests of Creativity Tests

<table>
<thead>
<tr>
<th>Description of Hypotheses</th>
<th>No. of Hypotheses</th>
<th>Six Dependent Hypotheses Scores, No. of Hypotheses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main effects</td>
<td>4</td>
<td>24</td>
</tr>
<tr>
<td>First Order Interactions</td>
<td>6</td>
<td>36</td>
</tr>
<tr>
<td>Second Order Interactions</td>
<td>4</td>
<td>24</td>
</tr>
<tr>
<td>Third Order Interactions</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Total Hypotheses</td>
<td>15</td>
<td>90</td>
</tr>
</tbody>
</table>

4.7 Definition of the Structural Model for the dependent variable scores of 2x2x2x2 Factorial Design

Again it is to be recalled that the investigator has selected extreme cases of levels. Hence the ANOVA model was to be a fixed-effect model. When the levels of independent variables are not randomly selected, the analysis of variance (ANOVA) is referred to as Model I or a "Fixed effect" Model.8

The structural model for a score in a four dimensional factorial design is:

\[ Y = G + A + B + C + D + AB + AC + AD + BC + BD + AD + ABC + ACD + ABD + BCD + ABCD + \text{Error} \]

where \( Y \) = Criterion or dependent score

\( G = \) Grand Mean Effect

\( A = \) Effect due to Institutional Climate of Schools

\( B = \) Effect due to Area of the pupils
C = Effect due to sex
D = Effect due to Caste
Error = Effect due to within groups variance

4.8 Techniques to be adopted for analysis of data and their interpretation

The analysis of the data ran through the following steps:

(1) Computation of the means and variances of 2x2x2x2 factorial design for (Y) six criterion scores.

(2) Computation of sum of squares of Y scores.

(3) The sum of squares are to be partitioned into 16 components and calculation of F ratios for each sum of squares of hypotheses i.e. 15 hypotheses for one score 15 x 6 = 90. F ratios for six scores of creativity.

(4) Homogeneity of variance test was not given because of the uniform cell size (12) in all the factorial designs. This has been suggested by C.M. Dayton and also Allen Edwards. This is because of the following reasons:

(i) No test of homogeneity variance is needed.

(ii) The computation by ANOVA is simple and straightforward because of uniform cell size.

(iii) The interpretations of ANOVA F ratios are exact and dependable i.e they are valid.

(iv) The calculations are precise and accurate.
After the significance of F ratios, to locate the significance of means "Scheffe's Test" would be employed. This test is a very robust test and conservative one. Therefore it would give significance only when there is a high difference between the means. That is the reason why it has been selected.
REFERENCES


4. Ibid p.32.

5. Ibid p.34.


CHAPTER V

ANALYSIS AND INTERPRETATIONS

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