CHAPTER -3
RESEARCH METHOD, DESIGN AND PROCESS

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CHAPTER -3
RESEARCH METHOD, DESIGN AND PROCESS

3.1 Preamble

The third chapter is research method, design and process. Research methodology is heart of research and scientific procedure. It is essentially an important procedure with carried out and researchers go out their work describing explaining and predicting phenomena. Its aim is to give the work plan of research and find out of result correlations necessary for the researchers to design a methodology for the problem chosen one should note that even if the consideration inn two problems is same the methodology may be different in this chapter research objective of design, study and selection of the research instrument are discussed, method for the collection of data and statistic for analyzing the data has also enumerat.

The present research is Creativity, Intelligence and academic achievement among ADHD and Normal students. In the present study researcher has selected two hundred and forty students. In this chapter the plan and procedures of the present study including the statement of problem, objectives, variables, method, sample, tool, collection of data, statistical technique etc will be discussed.

3.2 Problem of the Research

In research process the first and foremost step happens to be that of selecting and properly defining a research problem. Research problem is as follows:

“Creativity, intelligence and Academic achievement of children with Attention Deficient Hyperactivity Disorder and Normal”

3.3 Objective of the Research

The present study was aimed at studying the relationship between Creativity, intelligence and Academic achievement of children with Attention Deficient Hyperactivity Disorder and Normal students, objectives are as below:

1. To study intelligence of ADHD children in relation to their gender.
2. To study intelligence of Normal children in relation to their gender.
3. To study creativity of ADHD children in relation to their gender.
4. To study creativity of Normal children in relation to their gender.
5. To study academic achievement of ADHD children in relation to their gender.
6. To study academic achievement of Normal children in relation to their gender.
7. To study relation of creativity and intelligence among ADHD and Normal.
8. To study relation of creativity and intelligence among ADHD and Normal of their gender.
9. To study relation of creativity and academic achievement among ADHD and Normal.
10. To study relation of creativity and academic achievement among ADHD and Normal of their gender.
11. To study relation of intelligence and academic achievement among ADHD and Normal.
12. To study relation of intelligence and academic achievement among ADHD and Normal of their gender.

3.4 Hypothesis of Research

**Ho₁** There will be no significant difference between boys and girls on their level of Creativity.

**Ho₂** There will be no significant difference between students of 10 to 12 years age group and 13 to 15 years group on their level of Creativity.

**Ho₃** There will be no significant difference between ADHD students and Normal Students on their level of Creativity.

**Ho₄** There will be no Interaction effect with reference to gender × age of students in level of creativity of ADHD students and Normal Students.

**Ho₅** There will be no Interaction effect with reference to gender × Types of students in level of creativity of ADHD students and Normal Students.
H06. There will be no Interaction effect with reference to age of students $\times$ Types of students in level of creativity of ADHD students and Normal Students.

H07. There will be no Interaction effect with reference to gender $\times$ age of students $\times$ Types of students in level of creativity of ADHD students and Normal Students.

H08. There will be no significant difference between boys and girls on their level of Intelligence.

H09. There will be no significant difference between students of 10 to 12 years age group and 13 to 15 years group on their level of Intelligence.

H010. There will be no significant difference between ADHD students and Normal Students on their level of Intelligence.

H011. There will be no Interaction effect with reference to gender $\times$ age of students in level of Intelligence of ADHD students and Normal Students.

H012. There will be no Interaction effect with reference to gender $\times$ Types of students in level of Intelligence of ADHD students and Normal Students.

H013. There will be no Interaction effect with reference to age of students $\times$ Types of students in level of Intelligence of ADHD students and Normal Students.

H014. There will be no Interaction effect with reference to gender $\times$ age of students $\times$ Types of students in level of Intelligence of ADHD students and Normal Students.

H015. There will be no significant difference between boys and girls on their level of Academic achievement.

H016. There will be no significant difference between students of 10 to 12 years age group and 13 to 15 years group on their level of Academic achievement.

H017. There will be no significant difference between ADHD students and Normal Students on their level of Academic achievement.
$H_{018}$ There will be no Interaction effect with reference to gender $\times$ age of students in level of Academic achievement of ADHD students and Normal Students.

$H_{019}$ There will be no Interaction effect with reference to gender $\times$ Types of students in level of Academic achievement of ADHD students and Normal Students.

$H_{020}$ There will be no Interaction effect with reference to age of students $\times$ Types of students in level of Academic achievement of ADHD students and Normal Students.

$H_{021}$ There will be no Interaction effect with reference to gender $\times$ age of students $\times$ Types of students in level of Academic achievement of ADHD students and Normal Students.

$H_{022}$ There will be no significant difference between ADHD students and Normal students on their level of creativity.

$H_{023}$ There will be no significant difference between ADHD Boys and Normal Girls on their level of creativity.

$H_{024}$ There will be no significant difference between Normal Boys and Normal Girls on their level of creativity.

$H_{025}$ There will be no significant difference between ADHD Boys and Normal boys on their level of creativity.

$H_{026}$ There will be no significant difference between ADHD girls and Normal girls on their level of creativity.

$H_{027}$ There will be no significant difference between ADHD boys and Normal girls on their level of creativity.

$H_{028}$ There will be no significant difference between ADHD girls and Normal boys on their level of creativity.

$H_{029}$ There will be no significant difference between ADHD students and Normal students on their level of Intelligence.
Ho_{30}  There will be no significant difference between ADHD Boys and Normal Girls on their level of Intelligence.

Ho_{31}  There will be no significant difference between Normal Boys and Normal Girls on their level of Intelligence.

Ho_{32}  There will be no significant difference between ADHD Boys and Normal boys on their level of Intelligence.

Ho_{33}  There will be no significant difference between ADHD girls and Normal girls on their level of Intelligence.

Ho_{34}  There will be no significant difference between ADHD boys and Normal girls on their level of Intelligence.

Ho_{35}  There will be no significant difference between ADHD students and Normal students on their level of Academic achievement.

Ho_{36}  There will be no significant difference between ADHD Boys and Normal Girls on their level of Academic achievement.

Ho_{37}  There will be no significant difference between ADHD Boys and ADHD Girls on their level of Academic achievement.

Ho_{38}  There will be no significant difference between Normal Boys and Normal Girls on their level of Academic achievement.

Ho_{39}  There will be no significant difference between ADHD Boys and Normal boys on their level of Academic achievement.

Ho_{40}  There will be no significant difference between ADHD girls and Normal girls on their level of Academic achievement.

Ho_{41}  There will be no significant difference between ADHD boys and Normal girls on their level of Academic achievement.
**H042** There will be no significant difference between ADHD girls and Normal boys on their level of Academic achievement.

**H043** There will be no significant correlation between creativity and Intelligence among ADHD students and Normal students.

**H044** There will be no significant correlation between creativity and Academic achievement among ADHD students and Normal students.

**H045** There will be no significant correlation between Intelligence and Academic achievement among ADHD students and Normal students.

### 3.5 Variables of the Research

The following variables were selected on the basis of the study which is as follows:

#### 3.5.1 Independent Variables

(i) **Gender**

- (1) Boys
- (2) Girls

(ii) **Age**

- (1) 10 to 12 age group
- (2) 13 to 15 age group
Type of students

(i) 

(1) ADHD Students:

Students who are showing minor symptoms of ADHD according to DSM IV. Their class teachers were provided with the checklist to indicate the recurrent symptoms among the students’ studying in their class.

(2) Normal students:

Students when provide with the same check list to teachers did not indicated recurrent symptoms.

3.5.2 Dependent Variables

The dependent variables are the conditions of characteristics appear, disappear or change as the experiment introduces, removes or response outcome that the researcher measure in its study. This may have affected the independent variable.

(1) Level of Creativity
(2) Level of Intelligence
(3) Annual result of Academic Achievement

3.6 Research design

The main purpose of the research is to check main and internal effect independent variables 2×2×2 factorial design will be used.

Table 3.1
Sample (240)

<table>
<thead>
<tr>
<th>A (Gender)</th>
<th>A1 (Male)</th>
<th>A2 (Female)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C (Types of students)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1 (ADHD)</td>
<td>A1B1C1</td>
<td>A1B2C1</td>
</tr>
</tbody>
</table>
Where,

\[ A = \text{Gender} \]
\[ A_1 = 10-12 \quad A_2 = 13-15 \]

\[ B = \text{Age Level} \]
\[ B_1 = \text{ADHD students} \quad B_2 = \text{Normal students} \]

\[ C = \text{Type of students} \]
\[ C_1 = \text{boys Students} \quad C_2 = \text{girls Students} \]

3.7 Sample of the Research

This research is concerned with the problem of Creativity, Intelligence and academic achievement among ADHD students and Normals. In this research it is decided that the sample is to be obtained from English medium schools of Ahmedabad city. Such sample study and the collected information can be managed very carefully and more accurately.

(i) Gender

(1) Boys - 120
(2) Girls - 120

(ii) Age

(1) 10 to 12 age group - 120
(2) 13 to 15 age group - 120

(iii) Type of students

(1) ADHD Students - 120
(2) Normal students - 120

3.8 Tools of the Research

For this purpose the following test tools were considered with their reliability, validity and objective, mentioned in their respective manuals, over here three research tools were used which are as below:
3.8.1 Personal Data Sheet

In this research personal data sheet was prepared to collect personal information such as sex, age, family type etc.

3.8.2 Divergent production abilities test by Dr. K.N Sharma

It was J.P Guilford who gave the idea of “Structure of intellect” in 1950, prepared a Model by 1956 and revised it in 1957 and 1959 giving rise to 120 human mental abilities (although we cannot bind with such a fixture).

In the model he differentiated intelligence and creativity and substituted them by the terms convergent and divergent thinking abilities respectively. Convergent production is “closed system thinking” while divergent production is “open system thinking”. Both are problem solving, but convergent thinking leads to find one and only one correct answer from the already given ones to the test items (S), while divergent thinking leads to find new, various answers, without already given any answer is already known to everybody, but in divergent thinking the answers are not known to anybody to any test items.

On the basis of his Model Guilford gave six divergent production abilities: Ideational flexibility, Word Fluency, Associational Fluency, Expressional Fluency, Spontaneous Flexibility, Adaptive Flexibility, Originality and Elaboration. In his model of structure of Intellect, Guilford gave six types of products: units, classes, relations, systems, transformations and implication which the mind gives after it works with raw materials or contents. Ideational fluency is product as units spontaneous flexibility is product as classes, associational fluency is product as relations, expressional fluency is product as systems, originality is product as transformations, and elaborations is product as implications. Word fluency and adaptive flexibility are also units and classes respectively.

Word fluency is to give more words to stimulus. Word, may be synonyms or antonyms as asked for. It is more a vocabulary test.

Ideational Fluency is generation of more ideas to stimulus, may be word, phrase, sentence, story, quality or any idea etc.
Expressional fluency is to produce many ideas to fit a system or logical theories, may be in the form of sentences or verbal ideas etc.

Associational fluency is to produce ideas or words from a restricted area, i.e. relationship. It requires completion of relations, like production of relations, generation of synonyms, analogies, similarities, problem of likeness etc.

Spontaneous flexibility is production of a diversity of ideas in a relatively unrestricted situation. It may include variety of kinds of responses into classes, like number of considerations, or purposes, attributes or inherent characteristics of problem or product, number of shifts of category responses, versatility etc.

Adaptive flexibility involves changes-changes in interpretation of task, in approach or strategy or in possible solutions.

Originality measures quality. It indicates uncommonness or newness in the product. Various names like new, common, unusual, clever, singular, individual, idiographic, non-classifiable, novel, unique, remote, infrequent, surprise etc. are used to designate originality.

Elaboration indicates expanding or combining activities of higher thought. It is to provide specification of details that contribute to the development of a general idea. It shows production of detailed steps, variety of implications and consequences which can be quantitatively measured.

The battery of divergent production abilities contain six tests for measurement of the eight abilities given below:

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Divergent Production Ability</th>
<th>Name of the test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Word Fluency</td>
<td>Word production</td>
</tr>
<tr>
<td>2</td>
<td>Ideational Fluency</td>
<td>Uses of things</td>
</tr>
<tr>
<td>3</td>
<td>Associational Fluency</td>
<td>Similarities</td>
</tr>
<tr>
<td>4</td>
<td>Expressional Fluency</td>
<td>Sentence Construction</td>
</tr>
<tr>
<td>5</td>
<td>Spontaneous Flexibility</td>
<td>Uses test</td>
</tr>
<tr>
<td>6</td>
<td>Adaptive Flexibility</td>
<td>Titles</td>
</tr>
<tr>
<td>7</td>
<td>Originality</td>
<td>Titles</td>
</tr>
<tr>
<td>8</td>
<td>Elaboration</td>
<td>Solutions/Completion</td>
</tr>
</tbody>
</table>
From the table it is clear that broadly speaking there are only four abilities: fluency, flexibility, originality and elaboration.

The battery can be used on children, adolescent and adults.

1. **Word production test:** It contains item containing the subject to write more and more words starting or ending or both with a given letter. The wrong words are deleted and the total responses words counted, which indicates the ‘word fluency score’.

2. **Uses of Things test:** The test contains five items in the form of common things. The subject is required to write more and more and diverse uses of those things. The total number of appropriate answers, to all the five items gives the ‘ideational fluency score’.

3. **Similarities test:** the test contains six words-names of things and quantities to which the subject is required to write synonyms or related words as many as he can. The total number of appropriate response words to all the items shall indicate ‘association fluency score’

4. **Sentence construction test:** The test contains five items, In first four items four letters are places at little distance and five in the fifth, which indicate the first letter of words to make some sentences. Such items are used in other countries also. The total number of appropriate sentences shall indicate the ‘expressional fluency score’

5. **Titles test:** The test contains three short stories of three or four lines. The subject is required to give titles as many as he can, to each story. Two factors can be scored from the title responses: adaptive flexibility and originality. Irrelevant title, if any may be ignores. Since all the titles may be different, being of different trains of thought their total number will indicate’ adaptive flexibility score’

3.8.2.1 **Scoring of the test:**

Less the number of occurrence of a response more the weight it gets. Responses that occur more than 95 percent times are called common or unusual and do not get any score, If in a group of 100 subjects one response was given by a subject only once, it
will get a weight of 5 scores; and if a title responses was given by five subjects out of a group of 100 Subjects, it will get only 1 score.

3.8.2.2 Reliability of the test

Table 3.2

The test retest reliabilities of the Battery (Divergent Production Abilities) are given below:

<table>
<thead>
<tr>
<th>Sr.No</th>
<th>Name of the test</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Word production</td>
<td>.67</td>
</tr>
<tr>
<td>2</td>
<td>Uses of Things</td>
<td>.80</td>
</tr>
<tr>
<td>3</td>
<td>Similarities</td>
<td>.68</td>
</tr>
<tr>
<td>4</td>
<td>Sentences Constructions</td>
<td>.84</td>
</tr>
<tr>
<td>5</td>
<td>Titles</td>
<td>.85</td>
</tr>
<tr>
<td>6</td>
<td>Elaboration</td>
<td>.82</td>
</tr>
</tbody>
</table>

3.8.3 Draw a man test to test Intelligence by Pramila Pathak (2006)

In 1926, Dr. Florence Goodenough (15) published her work on measuring intelligence by children’s drawings in which she described the Draw-a-man technique for measuring intelligence. This was the first attempt to use standardized procedure to get a drawing done by the child and to score it objectively.

Sully’s study (67) of children’s drawing suggested a new approach in scoring he performance on Draw –a-man test. He has described the development in the representation of many of the body parts as observed in children’s drawing.

Each point in the list above was then studied in the age–wise samples of drawings of the human form given by Burt (6). It was observed that each point can be weighted according to the development seen in the drawings of successive superiority. Irrespective of chronological age they were classified into seven categories according to the development observed in the drawing as a whole.

3.8.3.1 Scoring of the test

The use of human figure to measure maturity (intelligence) is based upon the development of concept of human body.

Descriptions of the scoring points are based on the following human body parts drawn by the subjects:

Eyes, Nose, Moth, Head, Forehead, Chin, Ears, Hair or Hair dress, Face, Neck, Trunk, Arms, Palm & fingers, Legs, Feet & toes, Proportion – feet, Proportions- legs, Proportions-head, Proportions –arms, Motor control, dress, Indication of sex of the figure, Bust, Full figure, general environment or action.

Example wise description is given in the manual for detailed scoring.

3.8.3.2 Reliability of the test

Rank order coefficients (Rho) were calculated for eight age groups consisting of (9 -51) students. They ranged from .18 to .84. 60 drawings consisted of 30 drawings from H.S-E class and 30 from L.S-E class children ‘r’ calculated for he two groups were .87 and .95 respectively. The reliability co-efficient calculated with different samples. Most of them are around 0.9 indicating acceptance reliability of the scale.

3.8.4 Non Verbal Disabilities Checklist by Vishal Sood

Nonverbal learning disorder was first identified in 1967 by Doris Johnson and Helmer Myklebust. Their theory affirmed that damage to the right hemisphere of brain results in a specific set of learning disabilities affecting three general areas of processing: Spatial-Visual-organizational, fine-gross motor and social learning. This checklist consist 58 items divided in four area—I. Auditory and Visual Perception Disabilities, II. Fine Motor Skills
Disabilities, III. Attention Deficit Disorder and Attention Hyper Activity Disorder, IV. Socio-Emotional Disabilities. This checklist is standardized on children of primary, middle secondary, senior secondary and special Schools age range 8 to 15 years.

Table 3.3
Distribution of statements in four types of Non-verbal learning disabilities.

<table>
<thead>
<tr>
<th>Sr.No</th>
<th>Non-verbal Learning Disabilities</th>
<th>Item wise serial No.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Auditory and Visual Perception Disabilities</td>
<td>1 to 16</td>
<td>16</td>
</tr>
<tr>
<td>II</td>
<td>Fine Motor Skills Disabilities</td>
<td>17 to 28</td>
<td>12</td>
</tr>
<tr>
<td>III</td>
<td>Attention Deficit Disorder and Attention Hyper Activity Disorder</td>
<td>29 to 40</td>
<td>12</td>
</tr>
<tr>
<td>IV</td>
<td>Socio-Emotional Disabilities.</td>
<td>41 to 58</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td><strong>Total Statements</strong></td>
<td><strong>58</strong></td>
<td></td>
</tr>
</tbody>
</table>

3.8.4.1 Scoring of the test:

The checklist can be filled or completed either by the teacher or the parents of the child to be examined for early detection of non–verbal learning disabilities.

Table 3.4
Scoring procedure

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Always</th>
<th>Often</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Students who were identified with below average and some difficulty were included in this study under the category III.

3.8.4.2 Reliability of the test: The reliability index ‘r’ was found to be 0.763 which is significant at 0.01 level of significance, at df 348.
3.8.5 Annual result for academic achievement of students selected for study.

To identify their academic performance their last academic results (half yearly or final) were collected to know how come and to what extent ADHD has affected their academic performance.

3.9 Collection of data

In the present research to collect the data random method was used. In the initial stage students were approached in their schools and their willingness to participate in the study was obtained from their school Principal and Parents. The parents and school was assured that the data would remain confidential and name of any students will not be used in any part of the study. The data was selected from four different schools of Ahmedabad City of Gujarat State. Total 750 students participated for the study. On the basis of the Nonverbal disability check lists then students were filtered on the basis of the symptoms shown. Out of them 580 students were found to range in the Normal group whereas 170 were identified with ADHD symptoms. During the next process of identifying their creativity and Intelligence it was observed that students identified with moderate ADHD could not perform on the test. To get any task from these 50 students was difficult as these students were unable to write and understand the basic language skills. So they were excluded from the data. End of the test all the students were thanked for participating in the data collection.

3.10 Statistical techniques

Data collection was analyzed by appropriate statistical analysis techniques, to study influence of dependent variables under investigation in creativity, Intelligence and academic achievement. For this purpose following statistical method was used.

1. ANOVA (F test)
2. LSD (Least significance difference)
3. Correlation
4. T test
3.11 Chapter summary

In this chapter problem of the research, objective, hypothesis, variables, sampling, tools, reliability, validity of the scale, scoring, design and statistical techniques were described.

Result and discussion will be in the next chapter named data analysis, result discussion and interpretation.