CHAPTER III

METHODOLOGY

3.1: Introduction

Methodology of the study which includes the aim, objectives, hypotheses, participants, design of study, instruments, procedure, nature and size of the population, sample selected, and the statistical techniques employed for hypothetical analysis and interpretation of the data are described in this chapter.

3.2: Need for the study

This study is motivated by the concept of triarchic theory of successful intelligence. The purpose of this study is to assess the triarchic abilities among adolescents and their relationship with shyness and academic achievement. The abilities needed to succeed in school are undoubtedly an important part of intelligence. Intelligence tests were originally constructed for the purpose of classification of students according to academic ability. Hence, the abilities measured by traditional intelligence tests stressed on the academic aspects of intelligence and ignored the creative and practical abilities. These tests had limited predictive value for day to day performance. Thurston (1938), believed that Spearman's hypothesis of a general factor did not fully reflect the intelligence and was a practical success only because of the simple averaging of more primary mental abilities. So, to support a concept of intelligence on IQ test scores alone is to ignore many important aspects of mental ability.

The triarchic model of intelligence states that there are three components of intelligence, namely: analytical, creative and practical abilities, where analytical ability is similar to standard psychometric definition of intelligence, Creative ability is responsible for insight, synthesis, and the ability to react to novel stimuli and situations and Practical ability is related to solving real life problems in everyday life (Sternberg, 1985). The existence of Creative and Practical abilities show that Sternberg's theory views intelligence wider than Spearman's "g" factor theory. The Triarchic abilities test helps in exploring cognitive competence by assessing analytical, creative and practical abilities. This test contributes to the prediction of
academic success, adaptive functioning in a rapidly changing society, reasons for why some people with very high IQ often fail to succeed in life, and how individuals learn from experience and develop expertise.

It is argued that the triarchic theory provides new insights regarding the ways in which intelligence changes from early to middle to late adulthood and suggests certain properties of tasks and situations that make them more or less useful as measures of intelligence at various points in adult intellectual development. STAT (Sternberg Triarchic Abilities Test), a battery of multiple-choice questions, measures all the 3 components on separate scales. This theory has tried to understand the nature of intelligence by identifying the underlying cognitive processes involved in intelligence rather than assessing the mental abilities. Thus, it is not merely a test of book learning or test-taking brilliance. Rather, it reflects a broader and fundamental capability for comprehending our surroundings identifying and understanding the problem and figuring out what to do.

Grade appropriate knowledge is obtained by academic achievement tests, thus, it focuses on progress than potentialities. Admission for professional courses and selection for jobs is decided on the basis of scores rather than the analytical, creative and practical abilities of a candidate. Youngsters fail in the career front or are not satisfied by their own performance.

A person is deprived of many things because of shyness. It obstructs the opportunities and possibilities that a whole life can offer. Shyness does influence Social and Emotional Intelligence, whether it influences Analytical, Creative and Practical abilities need to be studied. Shy adolescents having analytical and practical abilities may fail to express their ideas in a socially accepted manner because of inhibitions and fear of negative evaluation. Thus, it can be said that the analytical and practical abilities may be curbed by fear of negative evaluation, reproof, blame or criticism or dominance by parents, teachers or friends and peer group. Those who are unable to balance between analytical, creative and practical abilities may not attain success. Studies are inconclusive, whether shyness affects analytical creative and practical abilities. Hence, the investigator tries to explore the triarchic abilities among adolescents and the relationships between academic achievement and shyness.
Thus, the questions such as whether shyness has influence on analytical, creative and practical abilities? Whether triarchic abilities and academic achievement are related? Should be investigated. Thus, understanding the inter-relationship between these variables would help to provide some remedial measures to reduce shyness and increase the abilities, which in turn increases academic achievement. The major focus of the study is to assess the triarchic abilities among adolescents and investigating the relationship between academic achievement, shyness and triarchic abilities and difficulties faced by shy students in the classroom. This may help teachers and other school personnel to use or formulate corrective measures to improve learning.

3.3: Aim

The aim of the study was to assess the extent of triarchic abilities and their relationship with academic achievement and shyness among adolescents.

3.4: Objectives:

- To assess the extent of Triarchic Abilities among adolescents.
- To assess the association between demographic variables and Triarchic Abilities.
- To find out the relationship between Triarchic Abilities and shyness
- To find out the relationship between Triarchic Abilities and academic achievement
- To find out the relationship between Academic Achievement and shyness
- To find out the influence of demographic variables on Academic Achievement and shyness.
- To provide measures to improve Triarchic Abilities that facilitates achievement or success.

3.5: Hypotheses

Following directional hypotheses were formulated for the present study

H1: The selected sample will have moderate levels of Triarchic Abilities
H2: Demographic variables significantly influence Triarchic Abilities
H3: Adolescents with higher levels of Academic Achievement will have higher Triarchic Abilities

H4: Adolescents with higher levels of shyness will have lower Triarchic Abilities

H5: Adolescents with higher levels of shyness will have lower Academic Achievement

3.6: Operational definitions of the variables

3.6.1: Shyness

Shyness is conceptualized as a condition of affective, cognitive, and behavioral and physiological components characterized by social anxiety and behavioral inhibition resulting from the feeling that others are evaluating the individual.

3.6.2: Triarchic abilities

There are three information processing components of intelligence such as meta-component, performance component and knowledge component which are reflected through triarchic abilities such as - Analytical ability, Creative ability and Practical ability. Analytical ability is the skill to learn from situation and reason inductively which calls for examining and understanding the problem focusing the relation of cognition to the internal world. Creative ability is the skill to cope with novelty or uniqueness. Practical ability, is the skill to solve real-world or everyday problems by focusing one’s attention to the relation of cognitive issue to the external world.

3.6.3: Academic achievement

Academic Achievement can be described as the extent to which a student has performed in a given academic field that is expressed by way of achieving grades. In short, it is the level of proficiency one has achieved in an academic area.

3.7: Participants

In the social and behavioral science researches sampling is usually done by probability and purposive sampling. Probability sampling involves selecting a
comparatively large number of units from a population, in a random manner. In this type of sampling probability of inclusion for every member of the population can be determined (Teddlie & Tashakkori, 2009). Probability sampling is therefore supposed to be the most suitable type of sampling for this research.

The sample for the study was selected through stratified random sampling technique to make sure that everyone in the sampling frame has an equal chance of being selected. Thus, considering external variables, such as diversity in social, economic, and cultural backgrounds, a list of the sample schools were randomly selected from different parts of Udupi and the lot was taken to decide the schools to be visited to collect the data. Primary and high school students studying in 5th to 10th and pre-university students of 11th and 12th class were selected for the purpose of the present study.

Once the schools were selected, the researcher approached the heads of the institutions and submitted a letter seeking permission to collect data. The principals of the schools were informed about the nature of the research. With the consent of concerned authorities, the data for this study was collected.

Before administering the tests, the researcher developed a rapport with all students who agreed to participate. Selected sample were administered the STAT and SAT along with demographic information and academic achievement. The sample selected consisted of adolescents from two developmental stages (early and late adolescents). They were studying in the schools and colleges situated in rural and urban areas of Udupi District in Karnataka.

The following schools and colleges from rural and urban areas were selected for the present study:

- Government P.U. College Vandse
- St. France Xavier School Udyavara
- St. Xavier P.U. college Udyavara
- V.S.V College Kuradi
- V.S.V High school Kuradi
• St. Mary's college Shirva
• Madhava Kripa English School Manipal
• Madhava Kripa Higher Primary School Manipal
• Christian High School Udupi
• Government P.U. College Udupi
• Christian P.U. college Udupi
• Board high school Udupi
• Government higher primary school Ajjarakadu

3.8: Inclusion criteria

1. Participants should be adolescents.
2. The age of the participant must range from 12-18 years.
3. Participants should be of both genders.
4. Participants should give consent to participate in the study.

3.9: Exclusion criteria

1. Adolescents with impaired cognitive abilities
2. Adolescents under psychological intervention
3. Adolescents who have taken similar tests earlier
4. Adolescents who are having developmental disorders, hyper activity disorder or substance used disorder

3.10: Tools employed in the present study are

• The Sternberg Triarchic Abilities Test (STAT) Level H - Sternberg (1993)
• Shyness Assessment Test (SAT) -D'Souza (2006)
• Academic achievement – Grade Point Average
3.10.1: TRIARCHIC ABILITIES TEST (STAT)

The Sternberg Triarchic Abilities Test (STAT) was developed to assess the components of Intelligence namely analytical, practical, and creative skills using multiple choice questions. Level H of the test (Sternberg, 1993) was designed to measure cognitive skills among secondary school and college students. The test measures each component of the triarchic abilities with three sub tests these components are considered as independent intellectual mental representations. Each of the three sub test for every aspect of intelligence contains items of the verbal, quantitative, or figural kind. Thus, the first four items belong to the verbal category, the next four to the quantitative category, and the last four to the figural category. These three sub tests in turn identify analytical ability, creative ability and practical ability. According to Sternberg (1999), use of a different domain, was done to confirm that the students who perform well on one particular domain, will be given an opportunity to display their capability.

The items in the multiple-choice test are distributed into nine subscales are as follows:

- **Analytical-Verbal:** Figuring out meanings of simulated words from natural circumstance. Subjects have to assume the meaning of new word given in the paragraph from the context. (Dealing with artificial words).

- **Analytical-Quantitative:** Subjects have to tell the number that should come next in a series of numbers. (Number series).

- **Analytical-Figural:** Subjects have to say which of the options fits into the missing space. (Matrices).

- **Creative-Verbal:** Subjects are presented with verbal analogies preceded by counterfactual premises. They have to solve the analogies as though the counterfactual premises were true. (Novel analogies).

- **Creative-Quantitative:** Subjects are presented with rules for novel number operations; they have to solve presented math problems with the help of rules given. (Novel number operations).
• Creative-Figural: a series of figural problem that involves one or more transformation; the subjects have to complete the new series by applying the rules to a new figure with a different appearance (Figure completion).

• Practical-Verbal: Subjects have to find a best solution to a set of everyday problems faced by an adolescent, by selecting the options given.

• Practical-Quantitative: Subjects have to solve everyday situations requiring the use of math problems based on the circumstances.

• Practical-Figural: Subjects have to answer questions about finding the way effectively through the area depicted in the map.

Thus, the STAT scale is composed of nine subscales and each subscale includes multiple-choice item with four different response options for a total of 36 items; from which the correct response could be selected. A scoring key is used for computing the scores.

Sternberg Triarchic Ability Test (STAT-1993), is the main assessment tool for testing the three aspects of intelligence called triarchic abilities. Studies carried out in several cultures like Finland, Hong Kong, Spain, and the United States have obtained a good overall internal scale alpha coefficients and supported both the structural and external construct validity of the STAT (Sternberg 1999; Sternberg et.al 2001; Sternberg and Grigorenko 2007; Zhang 2004).

Schmidt et al. (1997), indicated that the item reliability estimate for STAT is good (.79). The Cronbach alpha estimates of reliability are satisfactory but not high (.67, .56, and .72 for the analytical, practical, and creative subtests respectively), in part because within each subtest, the content domains (verbal, quantitative, and figural) are very different from each other (Sternberg,2006). Sternberg and the Rainbow Project 51 Collaborators (2006b), have reported cross cultural reliability and validity for STAT.

3.10.2: Shyness Assessment Test (SAT)

Shyness assessment test developed by D’Souza (2006), assesses three domains of shyness at three levels. The test consists of 54 items and requires the subject to indicate his/her response by putting a tick (√) mark under one of the three alternatives
(levels) - low, medium or high. The items in the test are related to three domains of shyness - Cognitive/Affective includes 32 items, Physiological 11 items and Action oriented consists of 11 items. Item analysis of the scale using SPSS program resulted in Cronbach's alpha coefficient of 0.7119. Further, this scale also has significantly high validity.

All the components mentioned above are important, but none of them is a universal aspect of the experience of shy people. Shyness as a global trait should be conceptualized as a personality syndrome that involves varying degrees of these three types of reactions. Based on the above points, SAT is developed exclusively on Indian adolescents by D'Souza (2006). The reliability index ascertained by split half (odd-even) method and Cronbach's alpha coefficient for the scale as a whole were found to be 0.735 and 0.812 respectively. The reliability indices of the 3 domains were also calculated by split half method, which are as follows:

Table 3.1

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Domain</th>
<th>Reliability Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cognitive/Affective Domain</td>
<td>0.826</td>
</tr>
<tr>
<td>2</td>
<td>Physiological Domain</td>
<td>0.792</td>
</tr>
<tr>
<td>3</td>
<td>Action-oriented domain</td>
<td>0.725</td>
</tr>
</tbody>
</table>

Academic Achievement test

Grade Point average was taken from school records

Table 3.2

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>75%-100%</td>
<td>Grade A</td>
</tr>
<tr>
<td>55%-75%</td>
<td>Grade B</td>
</tr>
<tr>
<td>35%-55%</td>
<td>Grade C</td>
</tr>
<tr>
<td>Below 35</td>
<td>Grade D</td>
</tr>
</tbody>
</table>
3.11: Procedure

In this study two different tools were used and academic achievement scores were collected from school records so as to assess and understand the relationship between triarchic abilities, academic achievement and shyness. In order to gather relevant data students from various schools and colleges were selected and the researcher obtained the data by administering specified tools.

3.11.1: Phase-I

Step 1: Sample selection was done in consultation with the concerned Heads of the Institutions and the Class teachers concerned. As per the inclusion / exclusion criteria, the students were selected for the study.

The researcher approached different schools and colleges, in and around Udupi district, met the heads of the institutions and appraised them about the importance of the present study. A letter seeking permission for collecting data was submitted to get consent from the concerned authority. After getting permission to collect data on a particular date and time, the researcher visited the institutions to collect the data. As this process of collecting data was bit lengthy, researcher visited the institutions 4-5 times depending on the specified number of sample. A group of 4-6 students were made to gather in a hall and rapport was established. Majority of the students were curious about the procedure and had many queries. It was quite natural that early adolescent students thought that the researcher is a teacher but when explained about the process of data collection they showed interest in giving their response. Some of the late adolescent students were curious when they understood that the data collection was related to their own Psychological issues. The researcher observed curiosity and interests and eager to know the scores in the pre administration session. This session was followed by main data gathering process.

3.11.2: Phase-II

Administred SAT on the selected sample; as a main data gathering tool for the study. The test consisted of profile and the main data related queries. The profile contained demographical data such as age, gender, area, parental education and
occupation. Thus, by giving required instructions data was collected from the sample to assess shyness.

Similarly the researcher administrated STAT on the selected sample, as a main data gathering tool for the study. The test consisted of profile and the main data related queries.

Academic achievement: With the consent of the administrative heads of the institutions GRA was obtained by the records maintained by the class teachers.

3.11.3: Scoring

3.11.3.1: Sternberg Triarchic Abilities Test (STAT)

Scoring of the STAT (9 sub scales with 36 questions of multiple choice is done with the help of the answer key. A score of one was assigned to the correct answer. Sub scale wise scores such as Analytical - verbal, quantitative and figural; Creative - verbal, quantitative and figural; Practical - verbal, quantitative and figural; were recorded. The sum of scores of the each subset gives the total STAT score. Based on the total score classification of High, medium and low level of triarchic ability scores were determined.

3.11.3.2: Shyness assessment test (SAT)

The subject had to indicate one of the three levels-low, medium or high. If the subject answers ‘high’ then a score of 3 was assigned, a score of 2 for medium level and a score of 1 for ‘low’ level. The scores for all the statements were cumulated and if the subject scored 81 and above he/she was considered as having high levels of shyness.

3.11.3.3: Academic Achievement scores (GRA);

With the consent of the administrative heads of the institutions, the records maintained by the class teachers were checked to obtain the academic achievement scores.
3.12: Statistical methods applied

1. **Descriptive statistics** -- Helps to summarize data and can only be used to describe the group that is being studied. The results cannot be generalized to any larger group. Any average, for example, is a descriptive statistic. Descriptive statistical techniques are Measures of central tendency such as Mean, Median and Mode; Measures of variability provide a means of describing the spread of scores in a distribution. These measures also indicate whether group under consideration is homogeneous or heterogeneous. The frequently used measures of variability are the range, standard deviation and quartile deviation:

   In the present study descriptive statistics like frequencies, percentages, mean and S.D were employed to understand the adolescent's level of triarchic abilities, academic achievement and shyness in general.

2. **Chi-square**: Helps in making predictions about the larger population from which the sample is drawn. In other words it is used when we want to draw conclusions by testing whether two variables are independent or not. That is, we can take the results of an analysis using a sample and can generalize it to the larger population that the sample represents.

   To find out the significance of difference between various groups of frequencies of Triarchic abilities, academic achievement and shyness-low, medium and high, Chi-square tests were applied in the present study.

3. **Contingency table**: Used to assess the association between rows and columns for any to categorical variables.

   This analysis was used to find out the association between levels of shyness and categories of demographic variables employed in the present study.

4. **ANOVA**: With ANOVA we can test the hypothesis, to compare two or more samples. The test results indicates the difference between two or more groups. One way was applied to verify the significance of difference between respondents in different shyness levels with triarchic abilities and academic achievement.

   The data were analyzed using SPSS for windows (version 16)