CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter describes in detail the manner in which the researcher conducted this research study. The chapter is organized under the following subheadings:

- Method of the study
- Sample and sampling techniques
- Variables and Tools for data collection
- Data collection procedures
- Data analysis techniques

3.2 Method of the study

3.2.1 Research Design:

The method selected for this study was decided on the basis of the nature of the research problem. As stated in the statement of the problem, the researcher wanted to find out relationship between motivational beliefs and self-regulated learning strategies and academic achievement of school students. In other words, the research has the inherent need to have survey method of investigation. A review of the literature suggests that a survey method is especially useful when the sample sizes are large, when the interrelationships between the variables need to be examined and when the differences between
samples in their response patterns have to be investigated (Best & Khan, 1993). The study was conducted among eighth standard students in secondary schools to obtain their regarding motivational beliefs and self-regulated learning strategies in mathematics. It enabled the researcher to get information and to find out the opinions of the school students at high school level. The use of this design enabled the researcher to evaluate and to compare responses of girls and boys students.

3.3 Sample and Sampling Technique

3.3.1 Population:
The population of this study included all students (boys and girls) in eighth standard of English medium schools belonging to SSC board in Pune City during the academic year 2004-2005.

3.3.2 Sample Size
More important than size is the care with which the sample is selected. This formula was used, because the number of the population was not available. The sample size was calculated 930 students. This study considered 10% for some mistake from students’ answer, so one thousand students were considered. The number referred in our study is as per the minimum required number for the sample. The standard deviation of the pilot study was 0.778, and $d^2$ was precision of the estimate. This study through the use of this formula, identified the sample size:

$$N = \frac{(Z \alpha/2)^2 \sigma^2}{d^2}$$

(Daniel, 2004) $\sigma$ = Standard Deviation $d$ = précise value

$\alpha/2$ = 2.5% $\rightarrow$ Z = 1.96

$\sigma = 0.778$ $\rightarrow$ $\sigma^2 = 0.605284$
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\[ d = 0.05 \Rightarrow d^2 = 0.0025 \]

\[ n = \frac{(1.96)^2 (0.778)^2}{(0.05)^2} \]

\[ n = 930 \]

3.3.3 Sample:

The sample of this study consisted of 1020 students (boys=518, girls=502) from English medium schools in Pune City. The students’ age ranged between 12 and 15 years. The mean age of students was 13 years and 6 months as on May 2005, which was the end of the academic year.

3.3.4 Sampling Procedure

This study applied cluster or area sampling and simple random sampling for selection of the sample. The area or cluster sample is a variation of the simple random sample that is particularly appropriate when the population of interest is infinite, when a list of the members of the population does not exist, or when the geographic distribution of the individuals is widely scattered (Best and Kahn, 2005). Pune City has a very big and wide-spread area and distribution of English medium school is very vast. So, out of the total number of 105 English medium schools (belonging to SSC board), 30 English medium schools were randomly selected (10 boys’ school, 10 girls’ school and 10 co-educational school). One class from each school of eight standard was randomly selected. All students in that one class were covered by the questionnaire. By this way, students from all divisions were included in the study (A division, B division …). The students who did not complete the questionnaire were out. In order to ensure that a representative sample of schools was chosen from Pune city, a decision was made to select approximately 30% of schools from which to draw the study population Total sample size for this research was 1020 students.

This successive random sampling of individuals would involve a relatively efficient and inexpensive method of selecting a sample of individuals (Best and
Kahn, 2005). To minimize chances of a sampling error, the researcher used a large sample of students.

**Reasons for selecting Eighth standard students for this survey:**

1) This is the stage of adolescence period and hence has a tremendous effect on pupil’s achievement in school and his or her life. It is the period of physical development and decision-making when maturity is attained. Therefore this age group is the most sensitive and creative age group of the students. These students are aware of the responsibility upon them. Therefore this period is the most crucial period for all-sided development.

2) In this grade, students do not have problem of transition from elementary to middle school (as the case is in sixth standard) and to college (10th standard). So, students could respond to the research instrument spontaneously since their tensions were under control.

3) Further more, eighth standard students in secondary schools in India do not have the board examination. This enabled the researcher to carry out the research without fear of interference which would have been occasioned by Board examinations.

**Reasons for selecting English medium schools:**

i) During the researcher’s visits to different schools (during pilot study), it was observed that students in Non-English medium schools had difficulties communicating in English. However, in English medium schools all students knew English, a prerequisite for responding to the research instrument.

ii) The Questionnaire used for this study was in English. Since the researcher understands English, it was possible to communicate with students in English medium schools and hence overcame a linguistic barrier that would have been
posed by contacting schools that used other mediums of instruction and communication.

iii) Students from English-medium schools constitute a sample that is generally from better socio-economic status, hence they have many similarities.

**Reasons for selecting mathematics as a subject:**

a) Most of the research shows that students usually prefer other subjects than maths. So knowledge about motivation and the challenges in this subject can help teachers in formulating strategies that would help students to enjoy the subject.

b) Mathematics is one of the important subjects that enable students to make their own decisions. Maths provides equal scope to both logical thinking and memory.

**3.4 Variables and Tools:**

**3.4.1 Variables:**

Variables are factors, which the experimenter monitors or controls. Dependent variable is a consequence of the independent variables. In other words, the dependent variable is that which changes according to the changes in the independent variable.

In the present study, motivational beliefs consist of self-efficacy, intrinsic value, test anxiety where as self-regulated learning strategies consist of cognitive strategy and self-regulation. These are the independent variables and academic achievement is the dependent variable.

**3.4.2 Control of the extraneous variables:**

The researcher tried to control the effect of the extraneous variables in the following manner to test objectives:
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- **Age**: All the students included in the study were over 12 years. The age range of the respondents was from 13-15 years and their mean age of was 13 years and 6 months by the end of the academic year under investigation (2004-2005).

- **School Environment**: Only government recognized private schools in English medium schools were included in the study.

- **Sex**: Both of the genders were considered for inclusion in the study.

- **Grade**: Only 8th standard students were selected for this study.

- **Test**: The same tests were applied to all the students in all the classes of the participating schools.

### 3.4.3 Tools

The data required for this study was collected by the use of one questionnaire; it was a standardized test for the students (MSLQ). It is presented below:

**a) Questionnaire for the students:**

The students responded to self-report Questionnaire (the Motivated Strategies for Learning Questionnaire. MSLQ, (Appendix, A) was developed by Pintrich and DeGroot (1990). The items were scored on a 7-point Likert scale from 1 (not at all true of me) to 7 (very true of me). This scale consists of 44 items and two scales:

- Motivational beliefs and self-regulated learning strategies.

1. Items revealed three distinct motivational factors:
   - a) Self-efficacy
   - b) Intrinsic value
   - c) Test anxiety
2) Self-regulated learning scale has two subscales:
   a) Cognitive strategy use
   b) Self-regulation

   Self-efficacy scale consists of nine items regarding perceived competence and confidence in performance of class work: 2, 6, 8, 9, 11, 13, 16, 18, 19.

   The intrinsic value scale consists of nine items concerning intrinsic interest in and perceived importance of course work as well as preference for challenge and mastery goals: 1, 4, 5, 7, 10, 14, 15, 17, and 21.

   Test anxiety scale consisted of four items concerning worry about and cognitive interference on tests: 3, 12, 20, and 22.

   Cognitive strategy scale consisted of 13 items pertaining to the use of rehearsal strategies, elaboration strategies such as summarizing and paraphrasing, and organization strategies: 23, 24, 26, 28, 29, 30, 31, 34, 36, 39, 41, 12, and 44.

   Self-regulation scale consisted of nine items and was constructed from meta-cognitive and effort management items. The items on meta-cognitive strategies such as planning, skimming, and comprehension monitoring effort management strategies included students’ persistence at difficult or boring tasks and working diligently: 25, 27, 32, 33, 35, 37, 38, 40, 43.

   All motivation and self-regulated learning scale are showed in the table below:
3.4.4 Validity of the Scale

Items of this scale were adapted from various instruments used to assess student motivation, cognitive strategy use and meta-cognition (e.g., Eccles, 1983; Harter, 1981; Weinstein, Schulte& Palmer, 1987, quoted in Pintrich & DeGroot, 1990). All of them have approvable face validity of this scale. This questionnaire also has construct validity in terms of their relationship with other motivational achievement measures (Pintrich, 1999).

In the present study, the pilot study was conducted in two divisions of 8th standard in one of English medium schools by the researcher (the school was excluded from the final research study). Results of pilot study showed that this test is suitable for use among eighth standard Indian students. Also researcher showed the scale to some experts and they accepted that this test can do for Indian students (face validity and content validity).

3.4.5 Reliability of the scale:
Pintrich and De Groot (1990) showed the reliability of each scale. Internal consistency coefficient for this scale was calculated with use of Kuder Richardson formula. The self-efficacy scale ($\alpha=0.89$), intrinsic value scale ($\alpha=0.87$), test anxiety scale ($\alpha=0.75$), cognitive strategy use ($\alpha=0.83$) and self-regulation ($\alpha=0.74$). Factor analysis was guide scale construction resulting in exclusion of some of the items.

The reliability of the scales was examined to find out whether they have an acceptable level of reliability for use in the India. The internal reliability coefficients were calculated for each scale. In the present study the alpha coefficient of internal consistency reliability for self efficacy was 0.82, intrinsic value alpha was 0.84, for test anxiety alpha was 0.68, for cognitive strategy was 0.77, and alpha for self-regulation was 0.78 ($N=100$). The reliability coefficients of the scales showed that these scales have substantial to high internal consistency with regards to the India sample.

b) Academic achievement: Other measurements in the present study were academic performance, obtained by collecting data on actual classroom tasks and examinations during the academic year 2004-2005. The researcher used an average score of three academic tests conducted during the year and the final examination results for mathematics. All marks were calculated out of 100.

Pilot study

A pilot study [preliminary trial] of research was deemed necessary for preparation of a sound research plan. A pilot study was a scale-down version of the main study to test the practicability and soundness of the procedures to be used.

In the present study, a pilot study was conducted to modify the tools, reliability and establish their validity for use among Indian students. Therefore, the pilot study was conducted in two divisions among eighth standard in one of English medium schools by respective researcher (the pilot school was excluded.
from the final research study). After the experience and analysis of the results of the pilot study showed that the responses from the trial sample did not indicate any need for modifications. The respondents did not point any problem areas in the instrument used. The results of the pilot study showed that this test is suitable for use among eighth standard Indian students.

3.5 Data Collection Procedures

The investigator approached the principals of the selected schools and took their permission to administer the test. Investigator also sought the cooperation of the class-teacher to conduct the class test. The concerned teachers helped to get students to their classrooms where the purpose of the study was highlighted and their cooperation sought by the researcher. The respondents were assured of the confidentiality of their responses and reminded that their responses would be used only for the purposes of research.

Students were instructed on how to respond to the items on a 7-point Likert scale in terms of their behavior in the maths class. They were requested to write their demographic characteristics (e.g., age, gender, school standard, role number, parents’ education and parents’ job. The tool (MSLQ) was distributed to the students. It took the respondents (students about 45 to 60 minutes) to complete responding.

Respondents were assured that they were free to seek the help of the researcher incase of any queries by raising their hands up. The researcher supervised the entire class while the testing was in progress. Finally, after completing, they were thanked for their cooperation. After the end of the educational year, researcher went to each school and received the score of three academic tests conducted during the year and final examination results for mathematics.

3.5.1 Difficulties Faced by the Researcher while Conducting Research:
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a) Contacting/getting permission of Heads

The researcher is indebted to Head teachers for granting permission to conduct research in the schools under study. Some of the head teachers were very positive about the study to the point of desiring to know the research findings. However, the researcher faced a number of challenges in the process of research as outlined below:

- During administration: Some of the principals were against conducting the test in their schools. They outrightly indicated that they had no time and suggested that the researcher could proceed to other schools. However, the researcher employed a lot of patience, persuasion and tact to the point of some of the Heads accepting to have the study done in their schools.

- Some principals allowed the study to be conducted but they were reluctant to give the marks of the students indicating that confidentiality could be breached if they allowed the researcher access to such marks.

- In addition, some Heads demanded lengthy explanations, reasons for the research and a lot of persuasion to allow the study to be conducted in their schools.

b) Conducting actual test in class-room (students):

- Some students did not know about their parents’ education and it was difficult for researcher to find out this kind of information.

3.6 Data analysis techniques:

To test the various objectives, some statistical techniques were employed in the present research, they are given below:

- Pearson correlation coefficient

- T-test

- Analysis of variance (ANOVA)
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Pearson’s Product-moment correlation was used to standardize the various scales through items-total correlation. It was also used to find correlation between variables in the present study. It has high positive value when corresponding standard scores are of equal sign and of approximately equal amount in the two variables. When Pearsons’ correlation is above the average in one variable and below the average in the other, the corresponding cross products will be negative. If the sum of the cross products is negative, the correlation will be negative. When some products are positive and some negative, the correlation will be close to zero (Anastasi & Urbina, 2003). For studying significant relationship between motivational beliefs and self-regulated learning components, Pearson correlation coefficient was used to find out correlation between variables.

Another statistical technique that was used in this study was t-test. For testing the means of two independent groups t-test should be used because t-test is for calculating the difference between means when sample are correlated. To compare the means between boys and girls in each variable, t-test was used. If there is significant relationship between variables of study t-test is used.

The present study also used One-way Analysis of Variance (ANOVA). Analysis of variance is a statistical procedure designed to analyze differences between the means of two or more samples. ANOVA is one of the most powerful techniques in statistical analysis. It is the most commonly used procedure for testing the significance for differences among several means simultaneously. To know about which groups have significant differences together, we have to use Post Hoc Test. For evaluation of influence of motivational components and self-regulated learning components on academic achievement of students and also influence of parents’ education on motivational beliefs and self-regulated learning components, this technique was used.