CHAPTER: 4

METHODOLOGY

4.0. INTRODUCTION

This chapter deals with methodology employed in order to achieve different objectives and to verify hypotheses of the study. Methodology is regarded as the heart of any research. Its provide picture of the whole study. It deals with sampling procedures, design, the tools used, details regarding collection of data and statistical techniques employed for analysis and interpretation of data.

4.1. Population

The population of the study consisted of all the students of standard VII, Gujarati medium schools of Surat city managed by Nagar PrathmikShikshanSamitiSurat. There were 282 schools which includes 177 Gujarati medium schools. Other schools were in Hindi, Urdu, Marathi, Telugu and Udia medium. So, all students in 177 Gujarati medium schools of SuratCity managed by Nagar PrathmikShikshanSamitiSurat formed population of the present study. Total numbers of the students were about 8000.

4.2. Sample

In the present study demanded three sets of sample. The tryout study conducted for tool to measure attitude towards Mathematicsand test ofmathematical weaknesseswhich was phase-I of the study. The phase-II dealt with establishment of psychometric property and the phase-IIIdealt with the study ofachievement in Mathematics with attitude towards Mathematics,Socio Economic Status(SES), Intelligence and Mathematical Weaknesses.

For phase-I first schools were selected randomly and all the students of selected schools were taken as sample. So, it is cluster sampling. For administration of the scale following schools were selected. The scale was administered on 400 students on selected schools shown in table: 3.3

For phase-II and to establishment psychometric property, first schools were selected randomly and all the students of selected schools were taken as sample. So, it is cluster sampling. For administration of the scale following schools were selected. The scale was administered on 200 students on selected schools shown in table: 3.6.

In the present study for phase-III multistage sampling was followed. In the first stage seven zones were considered. From these zones, schools were selected by proportional stratified sampling. Thus out of total 177, 51 schools were selected randomly. In third stage all the students of class VII in selected schools were considered for sample. All the students studying in standard VII of the selected Gujarati medium schools constituted the sample of the present study. Thus,Students were selected using cluster sampling and out of total students, 2122 students constituted the sample.

Table: 4.1shows the method ofproportional stratified sampling for phase-III.

Table: 4.1

ProportionalStratified Sampling Technique

	ZONE1	ZONE2	ZONE3	ZONE4	ZONE5	ZONE6	ZONE7	Total
No. Of Units	20	58	24	33	17	13	12	177
%	12	33	13	18	10	7	7	100
Unit Selected Through Proportion To Their Size As Sample	6	17	7	9	5	3	4	51

For Phase-III sample was selected from the following school in the academic year 2012-13. Table: 4.2 shows sample school for phase-III.

Table: 4.2

List of the School with number of students for phase:III

Sr. No.	Name of the School	Rank of the School	Number of students
ZONE A			
1	SarojiniNaydu	154	38
2	ShreeRamnarayanVishwanath	153	46

3	Swami Ramtirth	148	11
4	AayurvedacharyaShreecharakmuni	149	13
5	Dhumketu	218	37
6	Dr.SarvpalliRadhakrishnan	84	38
ZONE B			
7	ChandravadanChunilal Shah	17	10
8	ShreeIshwarlalGulabbhaiDesai	18	18
9	KavishreeJayantPathak	19	17
10	AacharyaA.R.Desai	20	17
11	ShreematiNandgauriNandshankarTuljashankar	144	15
12	SnehRasmi	104	17
13	PanditOmkarnathThakur	61	20
14	SreeHitenbhaiDesai	139	30
15	DanveerShethManekchandHirachandZaveri	134	5
16	ShreeGordhandasRanchhoddasChokhavala	81	22
17	ShreematiVasumatiThakar “Chachi”	137	15
18	Pra. TribhovandasGajjar	62	40
19	ShethShreePransukhlalMafatlal	60	24
20	ShreeKanaiyalalNanabhaiDesai	128	34
21	ShreeMahiparramRupramNilkanth	129	30
22	BhaktKaviShamal	107	43
23	Mother Teresa	108	18
ZONE C			
24	ShahidChadrashekharAazad	171	68
25	KrantiveerSardarsinhRana	113	82
26	SantKaviyatriPanbai	115	97
27	SantDongrejiMaharaj	114	79
28	Madam BhikhajiKama	116	57
29	Shyamji Krishna Verma	117	20
30	ShreematiJyotsanabenShukla	120	33
ZONE D			
31	Swami Sahajanand	273	58

32	GijubhaiBadheka	122	73
33	Dalpatram	132	89
34	RajaramMohanrai	59	60
35	SirKikabhaiPremchand	79	49
36	KavishreeDulabhaikag	54	71
37	KavishreePremanand	83	40
38	ShreeB.K.Thakor	86	418
39	KavishreeSundaram	24	59
ZONE E			
40	ShreeMahadevbhaiDesai	206	34
41	ShreeRatilalKeshavbhaiChauhan	207	55
42	ShreeJayprakashNarayan	45	29
43	ShreeParikshitlalMajmudar	197	46
44	ShreeManibenPatel	198	52
ZONE F			
45	ShreeKanaiyalalMunashi	225	96
46	ShreeKalyanjiViththalbhai	246	120
47	ShreeGanpatdasTrivedi	247	62
ZONE G			
48	ShethThakordas	1	20
49	ShreeVishnuprasadTrivedi	2	24
50	ShreeKunjviharMaheta	5	48
51	Shree Vasudev Smart	4	20
Total			**2122**

4.3. Tools

A research tools play a major role in any worthwhile research. Tool is the sole factor in determining the sound data and in arriving at perfect conclusions about the study.

In present study to collect the required data the following five tools were used.

4.3.1. Achievement Test

Final examination of first term and second term of Mathematics subject for class VIIof academic year 2012-13 considered as achievement tests. Question papers of both the terms made up of80 marks.So, the total marks of both the tests were 160. **Appendix-I**

4.3.2. Attitude Scale

The tool to measure attitude towards mathematicsconstructed and standardised by investigator. The tool will be constructed by "The method of Summated Rating scale given by Likert (1932)".The steps are given bellow:

(1) Identification of the components of attitude scale to measure attitude towards mathematics

The construction of attitude scale comprised of the components like usefulness of Mathematics, interest in the Mathematics and difficulties felt by students in the subject.

(2) Format and nature of statement

Each test item presents a statement. Statements were written that are favourable and unfavourable with respect to the attitude toward Mathematics. The item was provided with five options namely, strongly agree, agree, undecided, disagree, strongly disagree. There were positive polarity items to measure foreness and negative polarity items to measure againstness to attitude.

(3) Development and Selection of the statement

Each statement distributed on the basis of component and polarity. To make a selection from the pool of total statements, a tryout study has conducted.

(4) Response mode

While an individual responds to the scale, he/she decided one of the five option namely, strongly agree, agree, undecided, disagree, strongly disagree and indicate it by putting a tick mark ' √ ' in the corresponding box.

(5) Tryout of Attitude scale

A tryout study conducted on a sample approximate 400 students. The school selected for the final sample were not included for this purpose.

(6) Scoring procedure

Scoring procedure suggested by Likert (1932) for positive polarity and Negative polarity followed by investigator.

(7) The final format

Final selection of the statements that differentiate the high group and the low group under the procedure, suggested by Likert (1932) has adopted.

(8) Establishment of the psychometric properties of the attitude Scale

the reliability of the developed score was estimated by Cronbach's Alpha reliability statistics and split-half technique.

The face validity and content validity and percentile normswere established by investigator and Factor analysis was also done.

4.3.3. Intelligence Test

To measure the Intelligence, the Intelligence scale constructed by Shah &Patel (2010) was used by investigator in the present study. The test-retest reliability of the test was 0.79. Split half reliability was 0.91. Reliability by Rulon formula was 0.95. Reliability by KuderRichardsonformula KR20 was 0.91 and reliability by Kuder Richardson formula KR21 was 0.71. Validity of the test with Desai verbal-nonverbal group intelligence test was 0.75, verbal intelligence test was 0.85 and logical aptitude test was 0.76. Test having total 77 items based on six verbal and five non-verbal components. **Appendix-II**(Draft of Intelligence Test)

4.3.4. Socio Economic Status (SES) Scale

To measure the SES, the SES scale constructed by Patel & Patel (2005) has been used by investigator in the present study. The test-retest reliability of the scale was 0.6. The validity of the scale was 0.7. **Appendix-III**(Draft of SES scale)

4.3.5. Test of Mathematical Weaknesses

To study Weaknesses in mathematics, first investigator has taken opinion of teachers teaching Mathematics at primary level Gujarati medium school having minimum three years experience. From the opinions of teachers the investigator has prepared the test referring standard VII Gujarati medium text book of mathematics. It involves the following steps,

- Item selection and writing.
- Constructing the tryout form.
- Administrating the try out form of the test on small sample.
- Validation to expert.

4.4. Data Collection

The procedure of data collection for the study was carried out in three phase. In first phase data for pilot study was collected. In the second phase data related to variables attitude towards mathematics,(Socio Economic Status) SES, Intelligence and Mathematical weaknesseswere collected. And in the third phase the data pertaining to variables Mathematical achievement was collected. The details of these described below:

4.4.1. Phase-I

In the present study investigator has developed attitude scale to measure attitude towards Mathematics and constructed test of mathematical weaknesses. So, infirst phase data for tryout study was collectedduring the period of February, 2012. For this the Upshashnadhikari of Nagar PrathmikShikshanSamitiSurat was consulted to seek him permission to collect the data and accordingly the investigator met the principal and administered the tools to all the students of standard VII who were present at the time of data collection.**Appendix-IV**(Letter issued by Nagar PrathmikShikshanSamitiSurat)

4.4.2. Phase-II

In the present study investigator has developed attitude scale to measure attitude towards Mathematics and for the same to establish psychometric properties data was collected during the period of February, 2012. The investigator met the principal and administered the tools to all the students of standard VII who were present at the time of data collection.

4.4.3. Phase-III

During this phase, the data pertaining to variables attitude towards Mathematics, SES, intelligence and mathematical weaknesses of students were collected from all the students of standard VII who are studying in the selected school which comprise the sampleduring the academic year 2012-13.

For this the Upshashnadhikari of NagarPrathmikShikshanSamitiSurat was consulted to seek him permission to collect the data and accordingly the investigator met the principal and administered the tools to all the students of standard VII who were present on the time of data collection. To collect the data investigator went at least three times in each school.**Appendix-IV**(Letter issued by Nagar PrathmikShikshanSamitiSurat)

Before the administration of four tools scale to measure attitude towards mathematics, SES Scale, test of intelligence and test ofMathematical weaknesses, the students were made aware about the purpose of administration of the tools and were given the following instruction regarding the tools.

4.4.3.1. Instructionsfor Mathematical Attitude Scale

- The Mathematical Attitude Scale contains 34 statements which represent imaginary situations. You may come across these situations or may come across them in future.
- Five options Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree are given again each statement.
- Read each of the statement carefully and put tick mark "✓" against any one of the five options appropriate to you.
- Students were made very clear about their responses. They should give response based on what they believe and how they will behave when encounter the situation.
- They were made clear about the difference among five options strongly agree, agree, undecided, disagree and stronglydisagree by giving examples.
- They were informed that there is no correct or incorrect answer to any of the statements.

- They were instructed not to see or copy responses from their friends/classmates because belief towards object or phenomena differs from person to person.
- They were requested to give response to all thirty four statements.
- They were asked to read instruction provided on the first page of Mathematical Attitude Scale. They were informed to ask the investigator whenever they find any difficulty.
- They were informed that this is not a time bound test but read each statement carefully and respond according to your belief.
- The students were asked to write the full name, specify the gender name and number of the school. After completing such introductory formalities, the students were allowed to provide their response to statements in Mathematical Attitude Scale.
- Majority of the students were able to complete their responses to Mathematical Attitude Scale within 30 to 40 minutes.

4.4.3.2. Instructions for SES Scale

- Students were made aware about the SES Scale.
- The students were asked to write the full name, specify the gender name and number of the school.
- They were advised to provide correct information about their family background like…
- The students were informed to take help of investigator or teacher whenever they face difficulty.
- They were instruct to put tick mark "✓" or write correct number against the each items. They were instructed to provide instruction for all the factors.
- Most of the students were able to complete their responses on SES Scale within 30 minutes.

4.4.3.3. Instructions for Test of Intelligence

- Students were made aware about the importance of the intelligence test in the study.
- They were advised to read all the instruction given on the first page of the intelligence Test carefully.

- The students were asked to write the full name, specify the gender name and number of the school.
- They were informed that the intelligence test contain total 88 items. First 11 items explained by the investigator to the students remaining 77 items will be complete by them within the time period of 40 minutes.
- The students were asked to write their responses in the separate answer sheet by encircle the options. e.g. A, B, C, (D)
- They were informed that do not give more than one response to each items.

4.4.3.4. Instructions for Test of Mathematical Weaknesses

- Students were made aware about the test of weaknesses that it measures your basic competency and Score obtain on it are not going to be include in your final result.
- The students were asked to write the full name, specify the gender name and number of the school.
- They were asked to give response on each 28 questions (having sub questions) without any time limit.
- The students were informed to take help of investigator or teacher whenever they face difficulty.

4.4.4. Phase-IV

In this phase, the data pertaining to variables Mathematics achievement were collected from the respective schools record during the period of April-2013. Investigator consulted all the principals of selected schools and the data pertaining on the Mathematics achievement of all the students who were administered attitude scale, SES, Intelligence scale and Mathematical weaknessesscale were collected from the school record.

4.5. Data Analysis

In the present study, for objective one mean, median,standard deviation, skewnessand kurtosis was computed. To study the achievement in Mathematics with respect to selected variables and interactive effects of two or more selected variables on achievement in Mathematics were analysed through Analysis of variance (ANOVA).Assumption for ANOVA has been verified.