CHAPTER III

METHODOLOGY

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3.1.0 INTRODUCTION

The review of related literature which has been discussed in the previous chapter guided in orienting the present study and its plan and procedure or method of the study. The researcher has tried to present the details plan and procedure in this chapter which has been adapted to attain the objectives of the present study. The present study was experimental in nature and the methodology meant for this type of research is used in this chapter. In this chapter design of the present study, sampling techniques in detail, tools and technique employed, procedure to collect the data and various techniques employed for data analysis has been presented.

3.2.0 RESEARCH DESIGN OF THE PRESENT STUDY

The nature of the present study was experimental. The sample was selected purposively for the present study considering the nature and duration of the experiment. As purposive sampling technique was used to draw the sample, quasi experimental design was adopted to conduct the study. Under quasi-experimental design, post-test equivalent controlled group design was used in this present study. The design in detail is presented below:

O_1 X O_2

O_3 C O_4

Where, O_1 and O_3 are pre-test (Intelligence Test),

O_2 and O_4 are post-test,

X stands for Experimental Group and

C stands for Control Group.

Two groups, one as experimental and another as control group were selected purposively on the basis of above experimental design. At the beginning of the academic session both the experimental and control group was made equivalent on the basis of intelligence test score. The experimental group has undergone treatment and has been taught with the help of developed environment for teaching social science where as conventional teaching technique was adopted to deal with the control group

for whole academic session. The developed achievement test was administered at the end of both the semester I and II.

3.3.0 POPULATION

All the class VIII students (approximately 11000 students) of the 280 English Medium schools across Gujarat following Central Board of Secondary Education syllabus during the academic year 2013-2014 constituted as the population for the present study.

3.4.0 SAMPLE OF THE STUDY

From the total 280 English Medium schools across Gujarat state following Central Board of Secondary Education syllabus during the academic year 2013-2014 only 22 English medium schools were in Vadodara city. From these schools in Vadodara city, two schools i.e. New Era Senior Secondary School and Ambe School-Manjalpur from the Vadodara city of Gujarat State were selected with the help of convenient sampling method, those who were agreed to participate in the research study. Standard VIII students of New Era Senior Secondary School were selected as experimental group and the same standard VIII students of Ambe School, Manjalpur were selected as control group. On the basis of intelligent test both the groups were made equivalent with 36 students as the sample in both experiment and control groups. Both the groups were evaluated with the open book test but only experimental group students were provided Open Book Environment. Teaching of Social Science for the experimental group was done by applying the components of open book environment for entire academic year and control group was taught with traditional environment.

3.5.0 TOOLS USED

To collect the data following tools were used.

a) Intelligence Test-Raven's Progressive Matrices
b) Achievement test on social science
c) Reaction scale.

3.5.1 Intelligence Test

Raven's Standard progressive Matrices was used to measure the intelligence of experimental and control group students and to make the groups equivalent**.** It was an

individual intelligence test of non-verbal intelligence category to test the logical reasoning of students having 60 items which took almost 60 minutes to complete with the following standards.

- The split-half-reliability: 0.90.
- The test-retest-reliabilities: Varying between .83 and 0.93.
- Validity of the test: inter correlations are the highest with arithmetic, technological and scientific abilities.
- Correlations between the SPM and school performances result: up to 0.70.
- Correlations with other intelligence and ability tests: between .20 and .80.
- Factor-analytical calculations: high values in the g-factor up to 0.95.

3.5.2 Achievement Tests

The researcher developed two achievement tests in Social Science based on CBSE syllabus for semester I and II. Achievement tests were administered at the end of semester I and II to know the outcome of the research. Both tests were administered to both experimental and control groups. The test was developed based on the content of class VIII text book of CBSE of academic year 2013-2014. The item of test was mostly of higher order thinking skills including understanding, application, analysis, synthesis and evaluation. The main purposes of tests were to assess the student's ability to use appropriate logic and divergent thinking while answering the questions. The developed achievement test covers content knowledge (CK), Logic (L), divergent thinking (DT) and Achievement (A) in Social Science.

For both Semester I and II, blue prints were developed by the researcher for social science subject and based on those blue prints achievement tests were constructed. The blue prints mainly consisted of content distribution, question types including MCQ types, very short answer type, short answer type and essay type question weightage to testing abilities and marks distribution. The blue prints are given in Appendix- I. Both the achievement tests were of 50 marks each. The component like content knowledge, logic, divergent thinking consists of eleven questions and each question hold 5 marks. So, one component was allotted with 55 marks in the achievement test for both Semester I and Semester II. The prepared achievement tests were shown to five subject experts in the subject area for the purpose of finding

content validity. The suggestions of the experts were duly incorporated. The achievement tests are given in Appendix II. Same textbook of Social Science was followed in the schools of both the experimental and control group. Semester wise distributions of chapters are given in the table 3.1.

Table 3.1: Semester wise Distribution of chapters in Social Science text book.

Semester	CHAPTERS IN SOCIAL SCIENCE SUBJECT
Semester I	How, When and Where; From Trade to Territory; Ruling the Countryside; Resource; Land, Soil, Water, Natural Vegetation; Mineral and Power Resources; The Indian Constitution; Understanding Secularism; Parliament and The Making of Laws; Understanding Laws; Judiciary.
Semester II	Tribals, Dikus and the vision of a Golden Age; When People Rebel-1857 and After; Colonialism and the City; Agriculture; Industries; Human Resources; Understanding Our Criminal Justice; Understanding Marginalisation; Confronting Marginalisation; Public Facilities; Law and Social Justice.

3.5.3 Reaction Scale

A Likert type five point reaction scale was used by the researcher to collect the reaction of the students of experimental group about the open book environment in the class room of social science teaching learning and open book test. Thirty statements were included in the reaction scale. Statements were related to developed open book environment and its implementation. The 29 statements were positive statements and only one statement was negative statement. The prepared reaction scale was shown to five experts in the field of education for the purpose of finding content validity. The suggestions of the experts were duly incorporated. The reaction scale has been included in Appendix III.

3.6.0 DEVELOPMENT OF OPEN BOOK ENVIRONMENT

An effort had been made by the researcher to develop an environment for social science teaching learning for open book examination to provide more freedom and scope to the learner to think outside the book autonomously with appropriate logic. As most of the questions in the open book testing are of higher order thinking (HOT), this

environment particularly would help student in divergent thinking and to answer the questions in an open book test in a proper manner. In view of this aspect, the open book environment was designed and developed to create critical thinking and divergent thinking among students being within the approved syllabus of the selected schools. During the interaction with the school authorities, it was found that they may welcome those innovations in their classrooms. This implementation would not directly or indirectly affect the traditional achievement of their students in their traditional examination in social science subject. Hence, the researcher took measures to ensure that the research process would not affect negatively in the traditional academic achievement of the students in the social science subject and thus maximum care was taken to set up the open book environment. With this aspect two days training programme was conducted by researcher for Social Science teacher to create a suitable open book environment in the experimental classroom for social science teaching learning process. The teachers of the experimental group have been provided with prepared lesson plans of all chapters of Social Science and it has been requested to follow the developed steps for the carrying out of the open book environment. The researcher monitored all the activities from time to time and required modifications were executed.

3.6.1 Factors for creating an open book environment

The following factors are responsible to create the open book environment: i) The detailed power point presentations with pictures and diagrams were prepared by the researcher and supplied to the teachers, ii) Possible questions from the chapters of social science were prepared by the researcher and it was provided to the teacher for discussion at the end of the lesson, iii) At the conclusion of every chapters of the Social Science, teachers discussed about every possible questions of the content of Social Science that could be asked in the traditional close book testing with the answers. As a part of the lesson plan this component was also kept to avoid any negative impact of research in their traditional classroom practices; iv) Students were asked to answer the questions given in the exercises of each chapter and in case of any problem doing that they were asked to take the help of the subject teachers; v) To help the students to easily memorize the factual information with the help of concept mapping for which technological help was taken by the researcher. This concept mapping was also considered as a part of the lesson planning in an open book

examination; vi) The last step was to deliver presentation by each group in front of the whole classroom for intergroup sharing thus the open book environment was developed with no changing in the existing practices in terms of the examination and evaluation in Social Science.

3.6.2 Development of teacher orientation programme

With the vision to create a change in the existing system of schooling an open book environment was introduced. Researcher prepared an orientation programme to orient social Science teacher of the experimental school teaching for standard VIII. Social Science teacher were oriented by for the whole academic year. i) A two days orientation programme and a one day orientation programme were designed by the researcher for orienting Social Science teachers before the starting of semester I and semester II respectively (the detailed schedule of the two day training programmes is given in Appendix V). The one day orientation in the starting of the semester II was planned to provide remedial measures during the implementation of the open book environment and to discuss on those components of OBEn. ii) The researcher prepared training components to train the teachers for following the planned lesson plan and for using the PPT and the multimedia materials. iii) Training components were also designed to orient Social Science teachers from time to time on the basis of the classroom observations.

3.6.3 Preparation of lesson plans for open book examination

The most important components of the OBEn was to prepared such a type of lesson plans that would help the students to understand the topics easily and to create higher order thinking skills in students' mind in Social Science subject. The lesson plans also helps the teacher in the time of teaching and to reduce the time for presenting the chapters. The researcher prepared the lesson plan by using the topic related picture, diagram, map, related table etc. and this lesson plan provided to the social science teacher. Sample of lesson plans are given in Appendix IV. The following main components were included in the open book examination lesson plans.

i. **Teaching points to be covered:** All the teaching points of the content of a particular topic of social science have to be covered during the class of one period consist of 45 minute by the teacher.

ii. **Learning objectives:** The presentation of the content of a particular topic of social science has covered learning objectives include both general and specific objectives of social science teaching.

iii. **Content presentation in brief by the use of technology:** The content presentation generally done in the traditional classroom with 45 minutes. But in the open book environment the presentation time was squished by 20 minutes with the help of technology and multimedia approach and the teaching was also attractive for the student. The student understands the topic very easily and content matter stay in their mind for log time.

iv. **Questions of cognitive conflict/ cognition/cognitive reflection:** The researcher frames 5-10 questions which can have created students cognitive reflection from the every content of teaching. This type of question mainly based on the divergent thinking, imagination, application, analysis and synthesis.

Example of cognitive question

- Whether a people's revolt like 1857 would repeat in India in future? Support your answer.
- Do you think the present day women are considered equal in the society? Justify your answer?
- How would you like to praise or criticize Britishers for the present industrial India? Justify your answer.
- Suggest some innovative ideas by which untouchability could be abolished from India.
- 'Conservation of plant and animals is the ethical duty of every citizen'. Justify it.

v. **Collaborative learning activities/Intra-group discussion:** After the completion of each lesson the entire classroom was divided into 5-6 small groups by the teacher. The group had done the discussion taking one of the cognitive questions and prepares the probable answer on the basis of their discussion on group. Maximum scope was provided for their discussion. Here the teacher's role was to stimulate and guide the students.

vi. **Inter-group Sharing:** One or more members of each group would present their discussion points of the cognitive question and stimulate discussion

among them. Each group was provided maximum 4-5 minutes for their presentation. The teacher was not supported to evaluate the groups, rather support and encourage the group for thinking in a divergent manner. Inter group sharing also help to modify the social behavior of the student.

vii. **Question-Answer Session:** Researcher had prepared some question from each topic of social science and included it into the OBE lesson plan. Here the teacher asked the prepared question related to understanding of the students and it helped the student in their traditional examination so that OBEn may not affect negatively in their academic achievement.

viii. **Concept Mapping:** With the vision to create a change in the existing memorizing process the concept mapping was introduce in an OBEn. During this concept mapping, what the teachers taught in the classroom and what students understood about the content of Social Science, students need to prepare a graphic or line diagram of important points related to the entire content in a compact way by which student can construct the answer of the content of social science. In an open book environment as very small space was given to memorization, the concept mapping was the substitute in the memorization process.

ix. **Assignments:** Giving individual assignment at the end of every chapter was kept in the open book environment throughout the lesson plan which was of application level related to the adjacent environment including internet, news papers, TV etc. And this component was designed to have higher order thinking among students which could have some significance in the society and the environment. Teachers were asked to check the assignments of every student.

x. Q**uestions for open book testing:** To obtain the sample questions for open book examination from different chapters of social science easily open book questions were prepared from each lesson and it was included in the lesson plan. Therefore, 4 to 5 open book questions were created in every lesson plans and teachers were asked to talk about those questions throughout the regular teaching learning process.

3.7.0 IMPLEMENTATION OF THE OPEN BOOK ENVIRONMENT

The present study was conducted for the whole academic year 2013-14 on CBSE standard VIII in Social Science subject after getting consent from the school authority of both New Era School and Ambe School. From these schools, New Era School was taken as Experiment group and Ambe School was taken as Control group. The developed open book environment was implemented in the New Era School in standard VIII. The researcher prepared training programmes, lesson plans, tools for data collection and teaching learning content-materials for implementing open book environment. In the starting of the session, in the month of April 2013, two days teacher orientation programme was conducted by the researcher. The researcher demonstrated how to take the class with the help of model lesson plans. The prepared open book Lesson plans and study materials were provided to the subject teacher from time to time and the teacher was supposed to follow the steps which were designed by the researcher to create the desired environment for the Social Science teaching learning. Physical setting of the standard VIII class room was slight modified to give the facilities for the presentation of the content materials through LCD projector and to have facilities for small group work by the students.

During this time effort was also made to observe the speed of classroom teaching to ensure that the syllabus of the semester-I should complete in time. The teachers were advised not to punish students for any classroom activities and students were guided to keep self discipline during different activities of the classroom. Teachers were also advised not to hinder or ensure students that would influence in their thinking process inside the class. Achievement test for semester I was taken in the month of October 2013 for both experimental group and control group. Second phase teacher orientation programme was organised after semester I bringing little modification and minor change to improve the implementation of the open book environment. Throughout the semester, researcher used to monitor the teachers and the classes on a daily basis and provided feedback as per the need. The teacher was able to complete all the chapters of Social Science following the lesson plans designed for open book environment efficiently. Sample images of the implementation of the open book environment are given in the figures 3.2 to figure 3.7. In this manner the designed open book environment was implemented upon the experiment group by the researcher.

Figures 3.2: Teacher taking class using technology

Figures 3.3: Teacher-student interaction

Figures 3.4: Group activities in the Class

Figures 3.5: Students working in the group

Figures 3.6: Presentation of the group work

Figures 3.7: Students appearing Open Book Examination

3.8.0 DATA COLLECTION PROCESS

Data were collected both quantitatively and qualitatively during the academic year 2013-14 by the researcher. By administering the intelligence test, achievement tests and the reaction scale quantitative data were collected by the researcher. Qualitative

data were collected by observation of the classes of experimental group during the year 2013-14. Two sets of achievement test were constructed in the Social Science following the text book. One achievement test was constructed for semester I and another for Semester II for both the experimental group and the control group. The achievement tests were validated by the Social Science subject experts. Marks allocated for Semester I and semester II were of 50 marks each. For the data analysis the results of semester I and semester II were taken combined. Researcher prepares a reaction scale with 30 statements related to the development and implementation of the open book environment for Social Science teaching learning and open book environment for measuring the reaction of the students of the experiment groups about the developed open book environment and open book test.

Raven's Standard Progressive Matrix was used by the researcher for the experimental group and control group students to measure their intelligence for making the groups equivalent in the beginning of the experiment. By the use of the intelligent test the group were made equivalent. In both semesters-I and semesters-II, the experimental group and control group were appeared for open book test where they were free to access their text book and class notes. The developed reaction scale was administered on the experimental group at the end of semester II to know their reaction towards open book environment for teaching learning Social Science, and open book test. The experiment group was observed by the researcher during the entire academic session. Qualitative data were collected by the researcher for the further development study on the basis of the observations.

3.9.0 DATA ANALYSIS

The researcher employing quantitative data analysis techniques for analyzed the collected data obtained through achievement tests. For the analysis the collected data from semester I and semester II, were taken together. To analyze the quantitative data Mean, Standard Deviation, Standard Error of Mean and Mann-Whitney U-test were used by the researcher. As the sample was taken purposively the non-parametric Mann Whitney U-test was used to analyze the data because it is considered as the most powerful non parametric test equivalent to t-test of parametric family. Reaction Scale data was analyzed quantitatively by percentage analysis and intensity index. As per Biswal (2015), in the present study Intensity Index (II) is used to get the intensity of reaction of the respondents for each statement and the average intensity of reaction

for the total programme in a five point reaction scale. The following formula was used to compute the Intensity Index (II) for a specified statement.

II for Statement A=[(F1×5)+(F2×4)+(F3×3)+(F4×2)+(F5×1)]/(F1+F2+F3+F4+F5) (When, the scale values of 5,4,3,2 and 1 are assigned for the scale points of Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (DA) and Strongly Disagree (SDA) respectively on a given statement "A" And Frequencies for SA, A, UD, DA and SDA are F1, F2, F3, F4 and F5 respectively

Average Intensity Index (II) is the sum of intensities for all the statements divided by the total number of statements. The detailed analysis and d interpretation is given in the next chapter.