CHAPTER-3

RESEARCH DESIGN: PLANNING AND PROCEDURE

“The world today is economically richer and environmentally poorer than ever,”
Lester R. Brown, President of the World Watch Institute, Washington.

3.0 Introduction

Research is defined as the true search for knowledge which is kindled by the thoughts and works of scholars and their research work. Research study consists of planning and selection of proper tools for data collection and interpretation which can help fulfill the research purpose and assist obtain answers to the research questions in an efficient and effective manner.

Research design gives a proper direction and time-schedule to the research activity. It keeps a check on the research work and ensures its completion within a certain time limit. It also keeps the whole research project on the right track. According to Green and Tull "A research design is the specification of methods and procedures for acquiring the information needed. It is the over-all operational pattern or framework of the project that stipulates what information is to be collected from which source by what procedures."

This chapter consists of the research design of the study, specifying the research procedure, the methods and the tools used for data collection and data analysis and interpretation. The chapter also discusses the samples used for the study and the procedure of how the study was carried out.
The focus of this research work is to study the impact of Environmental Education on the social behaviour of the students and teachers, associated with colleges affiliated to the University of Mumbai. Environmental Education has been a part of the curriculum of the University of Mumbai since 1992. The study is motivated by a deep concern for the rapidly degrading environment around us and questions arising in the mind of the researcher about the efficacy of teaching Environmental Education to the undergraduate and post graduate students. After reviewing some of the vast literature available on the various aspects of Environment, the researcher designed a method which would assist her to study the impact of Environmental Education on the Students, Staff and Alumni associated with the University of Mumbai.

3.1 Title of the Study

The topic for the study undertaken by the researcher is stated as under.

*Environmental Education At The Mumbai University: An Impact Study*
3.2 Objectives of the Study

This research study was undertaken with the following objectives in view.

1. To evaluate the effectiveness of Environmental Education in creating awareness and concern about environmental problems among students of colleges affiliated to the University of Mumbai in Navi Mumbai
2. To find out whether the students and teachers feel capable and empowered to tackle the local environmental problems
3. To verify whether Environmental Education has brought about any change in the lifestyle of the selected sample of students and made them eco-friendly
4. To understand and enumerate the challenges and hardships faced by students and teachers in putting their ideas and plans of conservation and sustainable development into action.
5. To review the Environmental Education syllabus of the University of Mumbai and to give suggestions to make it more functional and activity oriented

3.3 Operationalisation of Terms

The researcher has used specific terms in the study with the following meaning. The primary words concerned with the research which have been operationalised are Environmental Education, Mumbai University, Impact and Study.

1. Environmental Education (EE) The subject introduced by the University of Mumbai in 1992, in place of Commercial Geography
initially in the Commerce course and later in other courses of higher education, in all the affiliated colleges in Mumbai and Navi Mumbai.

2. The University of Mumbai popularly known as Mumbai University (MU), is a State University located in Mumbai, Maharashtra, India. It was known as the University of Bombay until 1996 when the city of Bombay was renamed as Mumbai. The affiliated colleges of the university are spread across the city of Mumbai and four coastal districts in Maharashtra viz. Thane, Raigad, Ratnagiri and Sindhudurg. Navi Mumbai is located in the district of Thane. The university was founded by Dr. John Wilson in 1857 and is modelled on the universities of Britain. Mumbai University primarily imparts education through its affiliated colleges. It is located on the west coast of India in the State of Maharashtra and is one of the oldest universities in India.

3. Impact refers to the long-standing changes noticed in the social behaviour of the students studying Environmental Education and their attitude towards the environment. These changes are observed and statistically recorded by the researcher from the results of tests conducted on the students and with the help of other research tools employed in qualitative studies. Furthermore, the researcher herself, as a participant observer, has recorded the changes seen in the township of Navi Mumbai over a time span of nearly two decades reiterating that due to greater environmental awareness of the students, teachers, governing bodies and NGOs, Navi Mumbai now as much lesser environmental problems than its neighbouring town of Greater Mumbai, According to the researcher, the ‘Impact’ of Environmental Education on the social behaviour of the respondents is limited to the following areas.
a) Increase in the environmental awareness of the students  
b) Change in the behavioural practices of the respondents leading to environmental conservation  
c) Holistic changes in the environment, as initiated by teachers and alumni of the University of Mumbai

4. Study refers to the scientific analysis of the data collected and recorded by the researcher assisting the researcher to make certain observations and suggestions.

3.4 Nature of the Study

By virtue of being a study encompassing a time span of over a decade, the study is essentially a qualitative one. It is mainly based on descriptions of events, fieldnotes and observations made by the researcher herself, along with photographic evidence. Simultaneously, there are some numerical data, as well. For instance, to measure the effect of the course on EE offered to students during the past two years, a group of students was selected for the experiment. Their Entry behavior based on a test was compared with their post-treatment scores. This was a single-group pre-test /post-test experimental design.

3.5 Population

The population means the parent group of participants and observations from which a sample is to be formed. The sample observations provide only an estimate of the population characteristics. The description of the population and sample of the study are mentioned below.

As Navi Mumbai is a developing township with 24 nodes, set up to decongest Greater Mumbai in the 1970s, the population for the study comprised of nearly
5000 students and teachers who have benefitted from Environmental Education being taught in the growing number of colleges in this area since 1992.

3.6 Sample
The sample for the study comprised the following

- 250 students from various colleges in Navi Mumbai
- 20 senior professors and retired subject experts from the University of Mumbai
- 35 teachers associated with Environmental Education
- 4 prominent alumni members from the University of Mumbai
- Members of the civic authorities (10)
- Citizen participants of all age groups (approx. 1500)
- Voluntary workers of the NGO ‘Hariyali’ (approx 1000)

The sample was selected through Convenient Sampling Method. The citizens covered under the study were those the researcher came across during her field visits. The students selected for the experiment were those whom the researcher had taught Environmental Education during the past two years. The four colleges selected to collect data were the ones offering the course in Environmental Education. The NGOs and members of the civic authorities were those actually involved in the movements of environmental protection.

The following colleges from Navi Mumbai were selected for the study.

The researcher selected these colleges because of the following reasons.

- All the colleges are located in different nodes of Navi Mumbai.
- All the colleges have a large number of students who study Environmental Education as a course.
- All the colleges have a good number of teachers teaching Environmental Education.
- The researcher herself is a faculty member of one of the colleges wherein Environmental Education is offered across the Junior College, Under Graduate and Post Graduate courses.
- In order to achieve a variety of responses from students vying for different professions, the researcher selected different colleges of higher education.

3.7 **Data Collection Tools for the Present Study**

Methods of social research may be divided into two broad categories: Quantitative and Qualitative.

- Quantitative Methods employ research techniques that are used to gather information or data dealing with numbers and anything that is measurable. Statistics, tables and graphs are often used to present the results of these methods.

- Qualitative Methods are used to reveal the target audience’s behaviour and its perceptions and beliefs on specific topics or issues. The results of qualitative research are interpretative hence descriptive rather than predictive (Kuhn, 1961 p162) “large amounts of qualitative work have usually been prerequisite to fruitful quantification in the physical sciences”. Qualitative and Quantitative investigation go hand in hand.

- Data collection in the course of a research helps to obtain and record information, to take decisions about important issues and to pass
information on to others. Hence the data collection tools must be effective and strong enough to support the findings of the evaluation.

In the present social research the following tools have been used.

1. Content Analysis  
2. Questionnaire  
3. Interview  
4. Focus Group Discussion (FGD)  
5. Observation/Field Visits  
6. Pre-Test – Post Test  
7. Evaluation Rubric  
8. Document study, Photographic evidence and Newspaper clippings

1. **Content Analysis**

Content Analysis consists of analysing the contents of documentary materials such as books, magazines, newspapers and the contents of all other verbal material which can be either spoken or printed.

It is a research method for the objective, systematic and quantitative description of the manifest content of communication. Books, journals and newspapers may be analysed to study the changing attention to a particular issue over several years. (Brog:1983 P512)

Content Analysis prior to the 1940s, was mostly quantitative analysis of documented material concerning certain characteristics that can be identified and counted. But since the 1950s Content Analysis is mostly qualitative analysis concerning the general import or message. The analysis of content is a
central activity whenever one is concerned with the study of the nature of the verbal materials. A review of research in any area for instance involves the analysis of the contents of research articles that have been published.

In qualitative type of research the most commonly used methodology for research in education has been the content analysis. “The analysis may be at a relatively simple level or maybe at a subtle level when we pursue it on the basis of certain characteristics of the document of verbal materials that can be identified and counted (such as on the basis of major scientific concepts in a book). It is at a subtle level when researcher makes a study of the attitude say of the press towards education by feature writers” (Kothari C.R.: 2010).

About Content Analysis (from SP’s dissertation)p.85-86

While reviewing the related literature and analysing the textbooks for Environmental Education prescribed at the University of Mumbai the researcher has utilised the Content Analysis Instrument as one of the main tools for the study. The researcher has tried to analyse the text content using the Free Text Analysis Tool which gives statistics about the text including keyword count, text summarisation and similarity clustering. The frequency of key words such as ‘air pollution,’ ‘waste management’ ‘water logging,’ ‘mangrove destruction;’ and the responses of the respondents have helped the researcher understand the environmental problems of Navi Mumbai and record the innovative methods taken up to conserve the eco balance of the city. Analysis of the content thus carried out helped the researcher to frame questions for the interviews and focus group discussions. The responses received through the questionnaire were also analysed through the Content Analysis tool.
2. Questionnaire (Appendix 1)

A questionnaire is a useful evaluation tool to gather data from a potentially large number of respondents. It is a list of specially planned questions designed by the researcher to collect information. A questionnaire can be an effective research tool when it satisfies the criteria of objectivity, accuracy of measurement, validity, reliability and resource availability. Questionnaires are versatile, allowing the collection of both subjective and objective data through the use of open or close ended questions.

In this study the questionnaire used included both close and open ended questions which helped the researcher record the view, opinions and innovative actions by 200 students, 60 teachers and some prominent alumni who have felt motivated to conserve the environment and make a difference to society. Opinions and thoughts of the staff members gathered through this tool have resulted in debates and discussions which, in turn, have helped the researcher realise the importance of inclusion and teaching of Environmental Education.

This exercise was useful because it also helped the respondents to think on their own and not to merely give the "correct" responses. The respondents are also encouraged to enumerate the environmental problems of Navi Mumbai and back up their opinions with suggestions of innovative methods to overcome them.

While designing the questionnaires for the research work, the researcher has tried to keep the questions short and simple knowing that with a rise in the complexity scale there may be a corresponding decline in the number of completed responses as well as the quality of the responses.
Questionnaire No.1 (Appendix 1a) was formulated for the pilot study. It consisted of both subjective and open ended questions to help the researcher gather a general opinion from the respondents on the acceptability of Environmental Education as a new subject in the curriculum of the University of Mumbai. This questionnaire was used as a tool, on a random sample of 60 students and staff members from different courses of higher education, to help gather their responses regarding the rationale of introducing Environmental Education as a core subject by the University of Mumbai. The sample selected from the population was random yet purposive. On invaluable inputs received from senior subject experts and Professors from the Department of Geography, University of Mumbai Dr. S. Gandhi and Dr. V.S. Phadke the questionnaire was modified and reconstructed with 10 objective and subjective type questions.

Questionnaire No.1 was modified with close ended questions which proved more reliable and effective in studying the impact of Environmental Education in the social behaviour of the respondents. The main endeavour of the researcher has been to keep Questionnaire No.2 (Appendix 1b) easily understandable and free of bias. The modified questionnaire was used for the main study.

Thus, two questionnaires with 10 questions each were constructed and utilised during the course of the research work. Questionnaire No.1 was given to a random sample of 54 students and staff members to record the acceptance of Environmental Education as a useful subject in the curriculum of higher education in the University of Mumbai. Questionnaire No. 2 was utilised to study the impact of Environmental Education on the level of environmental awareness and the social behaviour of 200 students and 60 staff members associated with learning and teaching of the subject in the colleges of Navi
Mumbai. (This was the main study). The responses of this questionnaire were quantified and analysed.

3. Interview

A conversation between two or more people where questions are asked to obtain information is called an interview. In a one-on-one or Individual Depth Interview (IDI) a researcher has to devote more time but can get more information from the respondent.

Some very senior members of the teaching fraternity are sometimes averse to filling up questionnaires or taking part in focus group discussions. The researcher feels that interview is the perfect tool to gather information on the topic from the senior members of the population as more time can be allocated to each individual and a lot of in-depth knowledge can be acquired from the respondent who has ample time to retrospect and delve into the subject before giving the answer to the queries of the researcher.

In this study the researcher conducted extensive unstructured interviews with the senior professors and subject experts from the Dept. of Geography, University of Mumbai and senior lecturers from colleges affiliated to the University of Mumbai.

4. Focus Group Discussion (Appendix 2)

A focus group is a form of qualitative research in which a group of people are asked about their perceptions, opinions, and beliefs towards a product, service, concept, advertisement, idea or packaging. The first focus groups were created at the Bureau of Applied Social Research in the USA, by associate director,
sociologist Robert K. Merton. The term itself was coined by psychologist and marketing expert Ernest Dichter.

Powell et al defines a focus group as, “a group of individuals selected and assembled by researchers to discuss and comment on, from personal experience, the topic that is the subject of the research.” (1996: p499)

In this study, focus group discussion has been used as an effective tool to gain the views experiences and information from the teaching staff of different colleges of Navi Mumbai regarding the usefulness of teaching Environmental Education to the students of higher education associated with the University of Mumbai. The researcher used the focus group discussion to understand the respondents’ attitudes, feelings, beliefs, experiences and reactions while teaching Environmental Education in the classrooms. The focus group discussion helped the researcher acquire a large amount of information in a short period of time about the environmental problems in and around Navi Mumbai and whether the staff members were satisfied with the pedagogy they teach and felt motivated to bring about a change in the environment. In the course of the discussion the group members interacted with each other and reconsidered their thoughts and understandings of the environmental problems.

5. Observation

The researcher maintained field notes to record her field based observations. The interactions between the members of the students and teacher community involved in nature conservation work, members of the NGO ‘Hariyali’ and citizen participants were noted. The points kept in mind while recording field notes were
• Attempts made by the participants to reach out to the community.
• The concern and attitudinal change towards the environment by the participants.
• The ‘never say die’ attitude of all participants.

6. Pre-Test – Post-Test (Appendix 3a and 3b)

The researcher herself has been teaching the course on Environmental Education since 1997. With a view to measuring the effect of the teaching programme on a batch of students, a pre-test and a post-test were used to arrive at the difference made by the course on Environmental Education offered by the researcher herself during the current year. The pre-test and post-test were designed to measure the level of understanding of environmental concepts, the importance of environmental conservation and the need to nurture nature. The sample formed the students of First Year, Bachelor of Management Studies (BMS).

The experiment was conducted twice, once as a pilot study in Nov. 2011-12 and the other as the main study after nearly six months in April 2011-12.

A pre-test was administered as an Entry Level Test on the pilot group of 50 students from the First Year, Bachelors of Management Studies (BMS) course, to measure the level of their environmental awareness and understanding of environmental concepts. A response sheet was administered to the respondents comprising of 50 marks with 5 main questions and a few sub-questions. The questions were framed in such a manner that major aspects of the students’ environmental awareness and environment related behavioural practices got proper coverage. This was followed by teaching of the course using participatory and practicum-oriented methods such as group-discussion, field-trips, exhibitions and seminar presentations. At the end of the semester, a post-test was administered. The posttest included another set of 5 questions with the
weightage of 50 marks, framed on similar lines as the pre-test. It was administered on the pilot group at the end of the semester.

The pre-test comprised of 5 main questions with a few sub-questions. The language of the questions was kept simple and easy to enable understanding by the FY BMS students. Enough writing space was also provided on the response sheet, after each question to encourage a student to express his/her thoughts, if desired. Each of the 5 questions had been framed with a specific purpose to try and ascertain whether the students possessed certain qualities which may/may not be further enhanced with the help of a course in Environmental Education. Questions no.1 and 1.1 were prepared with the intention of realising the extent of environmental awareness of the students. Questions no.2 and 2.1 were placed to fathom the understanding of the student regarding environmental concepts. Questions 3 and 3.1 were framed to judge the student’s ability to explain the relationship between environmental cause and effect and attempt to justify them. Finally, in Questions no.4 and 5 the student’s theoretical/conceptual understanding was tested. After studying a course in Environmental Education for one semester the students were administered the post-test which also had 5 questions and sub-questions based on the same criteria as mentioned above for the pre-test.

7. Evaluation Rubrics

Rubrics are multidimensional sets of scoring guidelines that can be used to provide consistency in evaluating students’ work. Rubric makes assessing students’ work quick and efficient. They help to function as tools to support student learning and the development of sophisticated thinking skills. When used correctly, they serve the purpose of learning as well as evaluation and accountability. All rubrics have two features in common 1) a list of criteria in a project or assignment and 2) gradations of quality with descriptions of strong, middling and problematic student work. Rubrics have become very popular as
they help to acquire a quick feedback about the areas of strengths and weaknesses or the areas that need improvement in a student.

A rubric was prepared to assess the performance of the students who were taught the course in Environmental Education. The rubric was prepared keeping in view the objectives of Environmental Education as recommended by UNESCO vis-à-vis Awareness, Knowledge, Attitude, Skills and Performance. The rubric helped in acquiring relevant information pertaining to the personality development of the students facilitated by Environmental Education and even allowed the researcher to retrospect on improved teaching methods to improve the students.

8. Other non-numerical Evidence: Photographic Evidence and Newspaper Clippings

As the research was carried out at two separate levels --- as a longitudinal study in terms of the impact spanning over a period of a decade as well as a study to assess the effectiveness of a course offered for one semester in Environmental Education on the student respondents-- the researcher has gathered a great deal of photographic evidence and newspaper clippings to record and substantiate the on-site impact created due to the pro-environmental activities arising from empowerment and a change in the social behaviour of the respondents.

3.8 Research Method

With a view to meeting the above stated objectives, the Ex-Post Facto Method was employed. The pre-test, post test single group design was also used, albeit in a limited manner.

“The literal meaning of Ex Post Facto is “from what is done afterwards”. It means something done or occurring after an event with a retroactive effect on the event.”(Fred N Kerlinger 1964 p290). Kerlinger draws attention to what he
calls self selection in the ex-post facto research. He defines self selection as “the research case in which the members in the group being studied are in the groups, in part, because they differentially possess traits or characteristics that possibly influence or are otherwise related to the variables of the research problem”. (Ibid p362) Kerlinger identifies two kinds of self selection: self selection into samples and self selection into comparison groups. The first kind occurs when subjects are selected randomly into a sample and the second kind occurs when subjects are selected because they possess the dependent variable, or fall in one group or another.

The researcher has used the Ex Post Facto Research method to try and investigate the possible cause and effect relationship of the impact of Environmental Education, on the students, staff and alumni of the University of Mumbai and their level of environmental awareness and social behaviour. The Ex Post Facto research method was selected because it is a valuable exploratory tool particularly appropriate when a cause and effect relationship is being explored. This method is particularly suitable in social and educational contexts where the independent variable or variables lie outside the researcher’s control.

To study the cause and effect relationship of Environmental Education on the social behaviour of the respondents, the researcher concentrated on three distinct groups who transcend into the source of knowledge, namely students, staff and alumni from colleges affiliated to the University of Mumbai. The research was carried out at two separate levels -- as a longitudinal study in terms of the impact spanning over a period of a decade and more and as a study to assess the effectiveness of a course in Environmental Education offered during the first year of the BMS course. Being a longitudinal study, it is essentially descriptive in nature. For assessing the degree of effectiveness of
the course taught during the first year the pre-test /post-test experimental design has been employed.

3.9 Data Collection

The investigator collected the data personally using the tools and research method mentioned above.

The researcher carried out field trips and visited the sites where actual environmental conservation and up-gradation of environmental conditions was being carried out by the student community and nature-lovers. Some of these are enumerated here.

1. Retd. Principal Mr. Y.B. Bhide (70yrs), SIES College of Arts and Commerce, Sion (E), is the President of the NGO ‘Hariyali’ which since its inception in the year 1996 has been working with the help of students and teachers to make the Thane area an environmentally cleaner and greener and a better place to live. They have been especially active in the fields of Afforestation, Water Conservation, Solid Waste Management along with Nature literacy and awareness programmes for nature lovers. The researcher visited the Yeoar Hills in Thane and took photographic evidence of students from various colleges working in their free time and helping in afforestation and water conservation.
2. Alumni of the University of Mumbai, Mrs. Pranali Lad (43yrs) (Corporator, Ward No.12, Vashi) and her husband have taken great pains and efforts to maintain the Mini Seashore in Vashi, Navi Mumbai as one of the most talked about green spots of Navi Mumbai. Their efforts have been supported wholeheartedly by the senior citizens and others from all age groups. **Pictorial evidence** has been collected of people walking or jogging and watering the trees along the 3km joggers’ track with the help of small plastic buckets filled with water made available next to the water tanks along the track. Huge cement urns or ‘Kalash’ constructed along the Mini Seashore have today given way to modern dust bins urging people to drop the offerings of flowers or ‘Nirmalaya’ generated largely during festival times, into these urns/dustbins and not the sea.

3. The researcher herself an alumnus of the University of Mumbai, organises an annual ‘Jumble Sale’ in her college in a bid to recycle and
reduce the waste generated from households. In 2008 the money generated from the sale of used items was donated for the ‘Save The Tiger Campaign.’ Old yet reusable household items such as clothes, electronic items, crockery, books, soft toys and trinkets are collected in the college by students and staff members and later sold at a sale held for two days. Such sales lead to the recycling and reuse of the collected items. The local newspapers had boosted the morale of the students by giving encouraging write-ups about these events.

3.10 Research Procedure

• Having completed the initial study of the related literature, the researcher made an interview schedule and met and interviewed experts and academicians from the Department of Geography, University of Mumbai to understand and ascertain the reason why it had become necessary to replace Commercial Geography with Environmental Education in 1992 in the higher classes of the University of Mumbai.

• When contacted in Nov 2008, a very senior professor Dr. Arunachalam (Retd) University of Mumbai, HOD Geography Department 1992, Member of Board of Studies and Member of Academic Council pointed out that Commercial Geography was an optional subject being taught in many colleges in Mumbai before 1992. However, Commercial Geography was not taught in any other University in Maharashtra save the University of Mumbai. Very few students used to opt for this subject and so when talks of removal of this subject came up, Dr. Arunachalam and other experts realised that nearly 300 college lecturers teaching Commercial Geography were in the danger of losing their jobs.
• Another extremely respected and retired member of the Academic Council and former HOD of the Geography Department Dr. Sita Venkateshvarlu was interviewed in Dec. 2008. Dr. Sita Venkateshvarlu rationalised that in 1992 there was a growing awareness about environmental issues and that there was a directive issued by the University Grant Commission (UGC) to introduce Environmental Education in all the courses of higher education. This directive by the UGC made the introduction of Environmental Education and the phasing out of Commercial Geography relatively smooth. According to Dr. V. S. Phadke (Retd) University of Mumbai, HOD Geography Department, as Commercial Geography was somewhat related to Environmental Studies, it was easier to change some of the sections of syllabus of Commercial Geography and evolve it into the subject of Environmental Studies.

• Thereafter, the researcher met and interviewed the other experts from the Department of Geography one by one, all of whom expressed their solidarity to the fact that the introduction of Environmental Studies by the University of Mumbai had been a timely need of the hour. The lecturers who had to teach this subject had to undergo Orientation Courses to help them teach the subject effectively. At this time various text books on Environmental Studies were authored by senior professors with help from lecturers teaching pure sciences and other faculty from the Department of Commerce.

• The investigator planned the research procedure utilising the appropriate research tools needed to achieve the objectives of the study.
3.11 Data Analysis and Interpretation

The data obtained with the help of the questionnaires, Focus Group Discussions, interviews and field trips were analysed qualitatively using content analysis techniques. Both ongoing day to day analysis as well as end-of-programme analysis were carried out. The data gathered through the pre and post tests were analysed with simple statistical tools. Analysis and interpretation of the data were carried out keeping in view the objectives of the study.

3.12 Conclusion

This chapter is the scaffolding of the research. It discusses the systematic details of the research work carried out by the researcher. The details of the research design, the research methods, the tools used for data collection and the objectives of the study are the main points discussed in this chapter. The next chapter deals with the actual analysis and interpretation of the data collected.

दशकृपसमं चापी दशवापीसमं सरः ।

सरोदिशसमं: पुत्रः दशपुत्रसमसारः ॥

Digging up of ten wells is equivalent to a big step-well; similarly ten such big step-wells is as good as a lake; while excavating ten lakes is as good as bringing up a son while planting and nourishing one tree is as equivalent as bringing up ten sons.