

*Chapter III*

**METHODOLOGY**

## CHAPTER-3



### 3.0 RESEARCH METHODOLOGY

#### 3.1 SAMPLE:

The present study is planned to investigate the level of understanding about the concept of pollution, of the students studying in grade VI and VII. Thirty students from BHEL Model School, Bhopal were selected for the study. In grade VI there were 71 boys and 54 girls. (The ratio was 1.3:1). Therefore 9 boys and 6 girls were selected for the study. Similarly in grade-VII there were 87 boys and 45 girls. (The ratio was 2:1). Accordingly 10 boys and 5 girls were selected. Since data was to be collected through interview technique and time required for conducting the interview was about 50 minutes, the sample selected from a particular class included students who were willing to participate in the study. The teachers also helped in the selection of the sample, hence the sample was purposive. Since the students selected in the study were not only high achievers it can be said that the sample was representative of a heterogeneous population, representing urban population and approximately closer socio-economic level.

TABLE – 3.1 SAMPLE OF THE STUDY

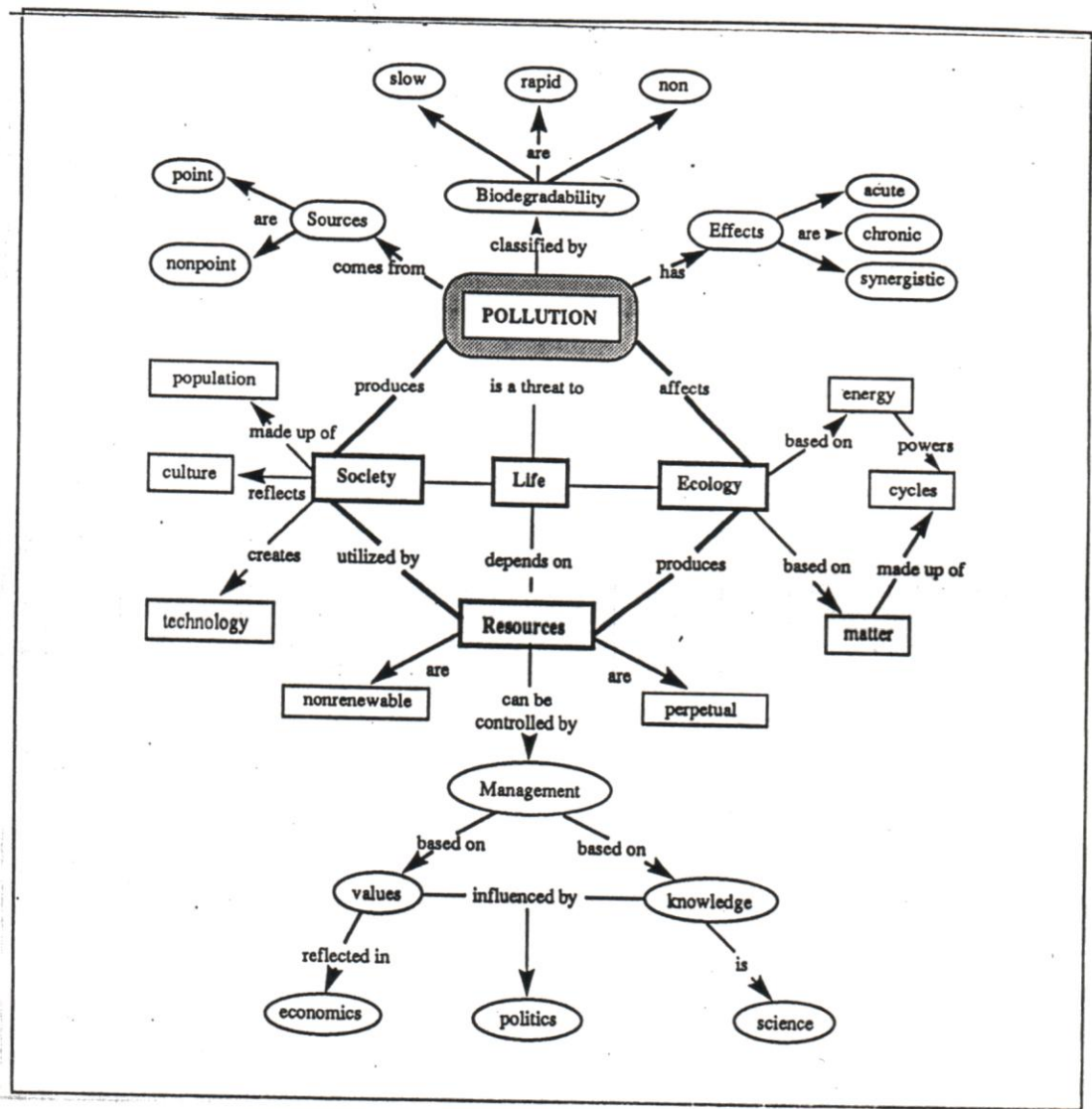
Name of the School	Class	Number of Boys	Number of Girls	Total number of students
Dr.Zakir Hussain Model Middle School Piplani, Bhopal	VI	09	06	15
	VII	10	05	15

#### 3.2 TOOL:

Tool was prepared keeping in view the objectives of the study. Accordingly, structured interview schedule was prepared for assessing their understanding about concept of pollution.

The topic of pollution was selected by the researcher because environmental issues are of concern all over the world. It is necessary to create an awareness of environmental pollution among all of us. Another reason for selecting the topic was that the investigator came across different cover stories, editorials and cartoons in local newspapers. Research articles related to pollution were scanned and text books of VI and VII grades were analyzed, to identify and compile the pertinent content for the students of VI and VII grades.

**FIGURE-I: CONCEPT MAP CONSTRUCTED BY BRODY'S RESEARCH TEAM TO DEFINE POLLUTION**

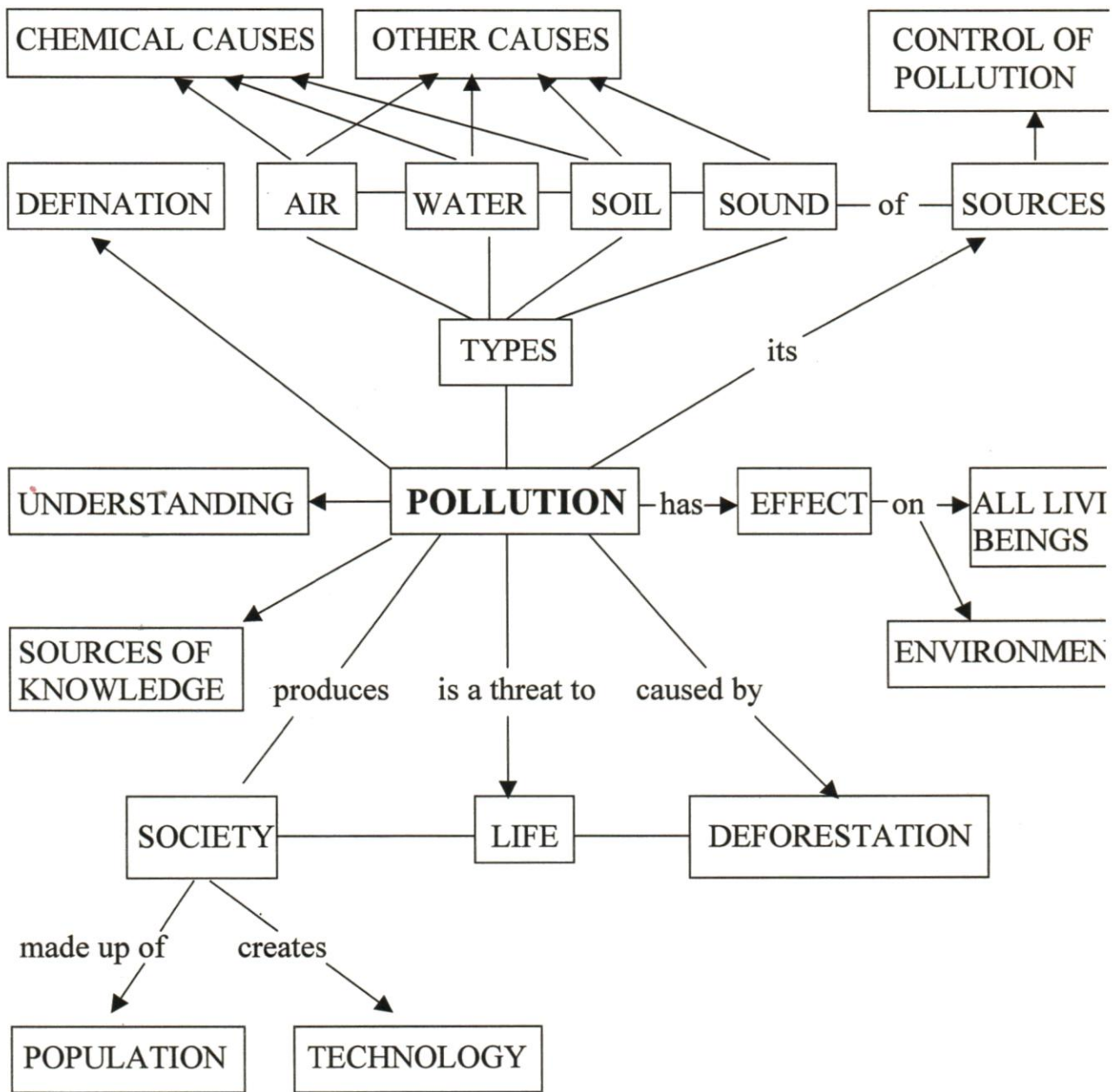


First of all a list of key concepts focussing on pollution was made. After extensive study of the available literature, short listing of pre-dominant concepts was done, after discussing with three experts. Superordinate concepts were identified and the more inclusive concept labels were used to represent and summarize a number of related specific concepts. This helped to reduce the number of concepts that become the focus of investigator's interview schedule. Since the study is based on Brody's (1991) study, concept map outlined by him was studied and discussed with subject experts. The concept map constructed by Brody's research team is given in **Figure-1**. A modified concept map was outlined, for preparing the interview schedule items, for the present study is given in **figure-2**.

Concept map was discovered by Novak and his team, can be used as a tool for curriculum planning and analysis. Making a concept map involves putting concept labels on a page and linking them, where appropriate with lines to show relationship. These lines are labeled with a suitable linking word, phrase or equation for linking the concepts. Concept mapping allows students to connect concepts in a variety of relationships. Students increase their understanding of subject content as they search for personal meanings of concepts, without which they cannot make connections in the map. Concept mapping has been investigated as a strategy for meaningful learning. . Novak & Growin 1984. Briscoe and LaMaster 1991). Concept map can be made of a unit, topic, lecture interview, review of literature and of a text. Concept map can also be used for curriculum construction and evaluation. In the present study concept map made a word-picture to prepare an interview schedule. Concept map helped in giving direction and limiting items as pollution is a broad topic.



**FIGURE – 2 :** CONCEPT MAP CONSTRUCTED FOR TESTING THE CONCEPT OF POLLUTION



Brody in his study compiled four content principles concerning pollution as a guideline for conducting and analyzing the students' interviews. Those principles are summarized in Table – 3.2.1.

**TABLE 3.2.1 – CONTENT PRINCIPLES RELATED TO POLLUTION**

- i. Pollution is harmful changes in the environment that affect the health and survival of living organisms through biological, chemical, and physical processes.
- ii, Pollution is caused by agricultural, industrial, residential, and urban development and some naturally occurring events. This include point and non-point sources. Toxic effects can be acute, chronic and synergistic.
- iii. Pollution disrupts ecosystems by affecting the survival of living organisms through changes in air, soil, and water quality. Survival is a function of interdependence among systems such as food webs and natural cycles such as nutrient cycles.
- iv. People's values influence their conception of pollution and their efforts to maintain an acceptable quality of life.

But the investigator in her study has used three content principle related to causes, affects and control of pollution, as taken by Broady. The third content principle taken by Brody relates to ecosystem. But the investigator in the present study delimited it to deforestation, which disturbs balance of nature. She did not frame questions on disturbance of ecosystem due to pollution. Similarly, Brody's fourth content principle which is related to influence of people's values and efforts to maintain an acceptable quality of life, has been modified to control of pollution, underlying theme is almost similar. The four content principles concerning pollution identified by the investigator in the present study are summarized in Table 3.2.2.

**TABLE – 3.2.2      CONTENT PRINCIPLES RELATED TO POLLUTION**

- i.      Pollution is harmful changes in the environment that affect the health and survival of living organism through biological, chemical and physical processes.
- ii.     Pollution is caused by residential, agricultural, industrial and urban development and some naturally occurring events.
- iii.    Deforestation and cutting down trees disturbs balance of nature by reducing the amount of oxygen. It also encourages erosion of soil
- iv.     Pollution of air, water and soil is done by man, and therefore it can be controlled by them only. Government is alert on pollution control.

Based on the outlined content principles the investigator prepared forty four (44) items for conducting interview to assess the levels of understanding about concept of pollution. These items were tried out. Interview was conducted on one student. This also helped in estimating approximate time required for one interview. The responses of the students were analyzed and discussed with the subject expert. On the basis of the analysis, three items were dropped and two items related to “1983 – Union Carbide Gas Tragedy” were combined into one item. Hence, the final interview schedule has forty (40) items. (See Appendix – A)

### **3.3 TEST ADMINISTRATION**

For collection of data permission was taken from the Principal of the school. Willing students of class VI and VII were interviewed.

Each interview began with a few broad questions to determine the student’s general understanding of pollution. Typical opening questions included:



1. What do you see in this picture ?
2. Why many people were killed in Bhopal gas tragedy ?
3. What are the possible sources of pollution in this diagram ?
4. What comes to your mind after you see this cartoon ?

These questions were integrated with the materials selected for the research.

The interview material included :

1. A picture showing main causes of air pollution.
2. Why thousands of people were killed in 1983 Bhopal Gas Tragedy ?
3. A picture showing possible sources of water pollution.
4. A cartoon showing 'sheshanag' who is unable to hold earth longer, as it has become more poisonous due to pollution.

Students responses were noted simultaneously in a space provided against each item on an evaluation sheet. Interview props were used to maintain interest and focus attention. Each interview lasted approximately 55 minutes.

### **3.4 SCORING PROCEDURE**

Analysis of students responses reflected on the students' level of understanding about the concept under study. Each response was then assessed for different levels of understanding as suggested by William and Marck (1988). So, interview sheet of each individual sample was examined and scored at five levels according to expected answers (see Appendix B). The understanding and misconception of students were measured on the basis of scoring in five categories which are as follows:

- A. **SOUND UNDERSTANDING:** From information obtained from EVS text valid responses for each concept statement were developed which represented sound understanding of that concept. Responses showing sound understanding contained all elements of the validated response for that particular statement.



- B. **PARTIAL UNDERSTANDING:** Responses demonstrating partial understanding of the concept were characterized by the student mentioning at least one but not all of the elements of the validated response representing sound understanding of that concept.
- C. **PARTIAL UNDERSTANDING WITH MISUNDERSTANDING:** These types of responses showed some understanding of the concept but also made a statement which demonstrated a misunderstanding of the concept. In addition some responses mentioned all of the elements of the validated response but also contained information which demonstrated a misunderstanding of the concept being evaluated.
- D. **COMPLETE MISUNDERSTANDING:** None of the elements of the validated response for sound understanding was demonstrated. An attempt to explain the concept was made; however, these explanations were misunderstanding not understanding held by scientists or states in science texts.
- E. **NO RESPONSE:** The response was characterized by one of the following the student simply restated the question; the student gave an irrelevant answer to the statement; the student replied, "I do not know", or "no response" was given to the statement.