Chapter 3
Research Design
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3.1 Introduction

‘Well planning means half work done’, these sentence indicates importance of planning in any job. Simple meaning of planning is ‘diagram of work to be done’. Word diagram is mainly related with field of construction. While making building, planning of rooms, walls, doors, windows etc. follows the need of user and firstly shown in building, plan. Construction work followed to plan will result in required building. Thus how to build residence how it looks depends on the building plan drawn by engineer. Same conceptual thinking is to be followed in any job. Thus planning means idea of what to do? and how to be done?

Planning is basic idea in field of research. Planning plays key role at every stage of research, from starting to ending. Research without planning results in series of non-directional efforts. Research plan is a ’prior planning’ done before starting actual research work. Research plan gives idea about how to make research work and what research will gain at end.

In present study researcher planed the work to be done during research work. Present chapter gives detailed description about steps planned and its operational implication during research.

3.2 Steps of research

The title of present study was ‘A study of effectiveness of media in teaching of environment education for undergraduate home science students of Saurashtra University’. Keeping title in mind and after review of various literatures and research work, researcher planned steps for present study. Looking to wideness of research, time limits and quality of work research decided to work step by step. Figure 3.1 shows planning of steps for present research.
Gathering information regarding environment education syllabus of different universities

Selection of common content for making modules

Development of content modules using different sources

Evaluation of content by subject experts

Making final form of modules

- Construction of environment ability test
- Standardization of environment ability test
- Administration of ability test on students (pre-test)
- Evaluation of answer sheets
- Making three homogeneous groups for traditional and experimental method

- Making Power Point Presentation for developed modules
- Writing script for documentary film on content of modules
- Development of documentary film according to script written

Treatment to traditional and experimental group

Administration of post-test

Collection of data

Data analysis and results

Figure 3.1: Steps of Research Planning
### 3.3 Universe of Research

A set of objects having characteristics which are to be studied during research is defined as universe for that research.

Looking to wideness of universe it is necessary to bound universe in certain boundaries. In present study researcher set up boundaries of research by accepting Saurashtra region as area of universe.

Looking to variables involved in present study, it becomes study of female students studying in faculty of Arts and Home Science at under graduate level in colleges affiliated to Saurashtra University. So;

- Every female student studying in faculty of Arts and Home Science at under graduate level in colleges affiliated to Saurashtra University was involved in universe.
- Female students of Arts and Home Science faculty studying in first year, second year and third year course in colleges affiliated to Saurashtra University were involved in universe.

Thus universe of present study was described as under,

- “Female students studying in faculty of Arts and Home Science in first year, second year and third year course in colleges affiliated to Saurashtra University were involved in universe.”

The number of objects involved in above universe was measurable so the universe was considered as ‘specific universe’ or ‘bounded universe’. Approx size of universe during year 2012-13, according to academic officer, Saurashtra University is shown in table 3.1.

#### Table 3.1
District wise size of universe during academic year 2012-13

<table>
<thead>
<tr>
<th></th>
<th>F.Y</th>
<th>S.Y</th>
<th>T.Y</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B.A.</td>
<td>14532</td>
<td>13733</td>
<td>13957</td>
</tr>
<tr>
<td>2</td>
<td>B.Sc.</td>
<td>281</td>
<td>390</td>
<td>372</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>14813</td>
<td>14123</td>
<td>14329</td>
</tr>
</tbody>
</table>
Thus size of universe was 43265 Female students studying in faculty of Arts and Home Science in first year, second year and third year course in colleges affiliated to Saurashtra University.

3.4 Sampling

It is very time consuming and economically expensive to study all objects of universe when size of universe is too large. In such situation it is preferred to probe out representative sample from the universe and to perform study on that drawn representative sample. Finally the results from sample are applied on universe as sample was representative of universe.

“The set of objects taken from universe and representing characteristics of objects belongs to universe is defined as Sample.”

There are various techniques to derive sample from universe. During sampling it is of prime importance to reduce objectivity of researcher to draw the sample. This make sample valid. According to characteristics sampling is been classified in three class. Classification of sampling techniques is shown in figure 3.2

![Types of Sampling Diagram]

Figure 3.2 different types of sampling.

According to figure 3.2 in present study probable and non-probable sampling techniques were used. Various sampling techniques were used at different stages of
research, table 3.2 shows sampling techniques used at different stage of research respectively.

Table 3.2
Different sampling techniques used during different stages of research

<table>
<thead>
<tr>
<th>Stage</th>
<th>Step</th>
<th>Sampling Type</th>
<th>Techniques of sampling</th>
<th>Approx Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Construction</td>
<td>Piloting</td>
<td>Probable</td>
<td>Stratified Random</td>
<td>190</td>
</tr>
<tr>
<td>Test Applied</td>
<td>Pre-test</td>
<td>Probable</td>
<td>Stratified Random</td>
<td>1260</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>Non-Probable</td>
<td>Stratified Purposeful</td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>Traditional method</td>
<td>Non-Probable</td>
<td>Stratified Purposeful</td>
<td>420</td>
</tr>
<tr>
<td></td>
<td>Experimental method-1</td>
<td>Non-Probable</td>
<td>Stratified Purposeful</td>
<td>420</td>
</tr>
<tr>
<td></td>
<td>Experimental method-2</td>
<td>Non-Probable</td>
<td>Stratified Purposeful</td>
<td>420</td>
</tr>
</tbody>
</table>

In present study during sampling prime importance was given to variables like faculty & area. The number of students in class at time of study was not found equal and stable so during sampling number of students in class was not considered of prime importance. All the students of selected standard were accounted as sample. Detailed information regarding size of sample and technique of sampling used during research is described in respective chapters and topics.

3.4.1 Sampling for piloting test

To derive adequate and proper sample, points considered were:

- Sample should be representative.
- Ratio of boys and girls should be maintained.
- Ratio of urban students and non urban students should be maintained.
- Ratio of students according the standard of study should be maintained.

Researcher randomly selected four colleges of Saurashtra University to apply pilot test. Researcher taken oral permission of principle to perform test on students of their colleges. After permission of authority researcher randomly select students from Arts, Commerce, Science and Home Science faculty. Sample size during pilot testing
schedule was as listed in table 3.3 while details are discussed in respective chapters and topics.

Table 3.3
Sample selected during pilot testing

<table>
<thead>
<tr>
<th>Area</th>
<th>Rural</th>
<th>Urban</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Faculty↓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arts</td>
<td>25</td>
<td>10</td>
<td>22</td>
</tr>
<tr>
<td>Science</td>
<td>16</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Commerce</td>
<td>15</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Home Science</td>
<td>21</td>
<td>0</td>
<td>26</td>
</tr>
<tr>
<td>Total Male</td>
<td>21</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>Total Female</td>
<td>77</td>
<td>69</td>
<td></td>
</tr>
<tr>
<td>Total Urban</td>
<td></td>
<td>91</td>
<td>189</td>
</tr>
<tr>
<td>Total Rural</td>
<td></td>
<td>98</td>
<td></td>
</tr>
</tbody>
</table>

3.4.2 Sampling for pre test

To derive sample for pre-test researcher selected six women’s colleges of Saurashtra University. Looking to strength of Home Science faculty all students of Home Science faculty was selected in sample and from Arts faculty respective students were selected randomly from students present at that time. Excess sample was taken at pre-test time as looking to probability of rejection of answer sheet because of uncompleted filling or other fault.

3.4.3 Sample for treatment groups

According to scores obtained by students in pre-test, researcher arranged students of individual college in descending order according to their faculty. As researcher has to prepare three groups, all students of individual faculty were divided in three groups as higher achiever, medium achiever and low achiever. Taking equal numbers of students from each achievement group researcher prepared three homogeneous groups for both faculties in each college. Thus for each college researcher prepared three homogeneous groups to conduct treatment. Details are shown in table 3.4 and also in respective chapter and discussion.

110
Table 3.4
Centre-wise sample for experimental and traditional method groups

<table>
<thead>
<tr>
<th>Centre</th>
<th>Faculty</th>
<th>B.Sc.</th>
<th>B.A.</th>
<th>B.Sc.</th>
<th>B.A.</th>
<th>B.Sc.</th>
<th>B.A.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keshod</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>210</td>
</tr>
<tr>
<td>Junagadh</td>
<td>25</td>
<td>45</td>
<td>25</td>
<td>45</td>
<td>25</td>
<td>45</td>
<td>25</td>
<td>210</td>
</tr>
<tr>
<td>Upleta</td>
<td>19</td>
<td>51</td>
<td>17</td>
<td>53</td>
<td>19</td>
<td>51</td>
<td>19</td>
<td>210</td>
</tr>
<tr>
<td>Rajkot</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>210</td>
</tr>
<tr>
<td>Morbi</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>210</td>
</tr>
<tr>
<td>Surendranagar</td>
<td>25</td>
<td>45</td>
<td>25</td>
<td>45</td>
<td>25</td>
<td>45</td>
<td>25</td>
<td>210</td>
</tr>
<tr>
<td>Total</td>
<td>174</td>
<td>246</td>
<td>172</td>
<td>248</td>
<td>174</td>
<td>246</td>
<td>174</td>
<td>1260</td>
</tr>
<tr>
<td>G.Total</td>
<td>420</td>
<td>420</td>
<td>420</td>
<td>420</td>
<td>420</td>
<td>420</td>
<td>420</td>
<td>1260</td>
</tr>
</tbody>
</table>

3.5 Selection of the tool

Present study was aimed to develop and standardize new tools for measurement of environment awareness. To establish validity of constructed tool, factor analysis was performed. To establish validity; test split half method, KR-20, Cronbach’s alpha, Spearman-Brown split-half and Guttmann split-half coefficient method were used.

Present study was also aimed to develop authentic e-material for content of environment education. Researcher developed content-wise print material, computer based content-wise power point presentation and content-based documentary film.

Researcher first developed printed material for environment education, using various sources of content. Developed material was judged by authentic experts who have long experience in respective subjects. According to their suggestions, change was made in content material and thus final printed material was developed. Content material was developed in four modules.

From content material researcher prepared lecture note and also prepared power point presentation in MSOffice 2007, computer programme. For each module
separate lecture note and presentation was developed. To prepare documentary film researcher taken help of professional documentary film making agency. Documentary film according to script written by researcher was developed by Ms. Malti Mehta, Media and Communication expert. - 607, Shiti Ratna, Panchvati, Ahmadabad-6.

3.6 Data Collection
Data collection was carried out during academic year 2011 to 2013. From piloting test to final test researcher personally visited the selected colleges to collect data. Plane for experiment treatment and data collection was scheduled in working days of colleges, keeping in mind that examination of colleges, holidays and other circumstances may not interrupt data collection schedule.

Written permissions for testing and experiment were taken from principal of colleges. During each experiment treatment and post-testing schedule researcher tried to manage uniform condition for sitting arrangement, discussion of instruction and timing of test.

Filled answer sheets were bunched according to groups for interpretation of data. Test booklets were checked regularly to cancel such test booklets in which students marked answer or written any unauthorized writing.

3.7 Scoring key
For test scoring keys was developed separately on plastic paper. Scoring keys was able to identify correct answers given by student. Using answer key score of student in test was interpreted.

3.8 Interpretation of score
Using answer keys score of student in particular test were derived. Standards for scoring were as under:
1. For every right answer student get score ` 1 `. 
2. For every wrong answer student get score ` 0 `. 
3. Sum of right answer in test was considered as ability score of individual in that test.
Data of answer sheets were entered in respective worksheets, prepared in MS-Excel computer programme.

3.9 Statistical Analysis of Data

In present study different types of statistical procedures were followed for data analysis. The data obtained from pilot testing of test, were analyzed to select the items for final test. Data of piloting were arranged in descending order. From these arranged data difficulty value and discrimination value of each item were calculated. For distracter analysis objects from sample were selected and according to their selection of option (distractor), analysis for each item of test was done. The item having difficulty value in between 0.20 to 0.80 and discrimination value more than 0.20 were selected to involve in final test. Thus items having acceptable difficulty value, discrimination value and proper according to destructor analysis were involved in final test.

Reliability of test was established using split-half method KR-20, Cronbach’s alpha, Spearman-Brown split-half and Guttmann split-half coefficient method were used.

Validity of test was established by using factor analysis. Data-model fitness test was carried out on sample selected for factor analysis.