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CHAPTER THREE
RESEARCH DESIGN AND METHODOLOGY

3.0 Introduction

“A system of models, procedures, and techniques used to find the result of a research problem is called a research methodology (Panneerselvam, 2007:2).”

John and Kahn (2006:32) mentions about methodology, “the term ‘methodology’ is a broader term, in the sense it comprises type of research, method of research, nature of population, selection of sample, selection and preparation of tools, collection of data procedures, and selection of statistical tools. Research Methodology also directs which design is implemented. The methodology employed often determines the quality of the data set produced”.

The present chapter details the planning and description of methodological principles and design adopted for the study by the investigator for arriving at certain conclusions. It represents the details of the population and sampling procedure, the research design employed, the research tools used for the study, tools and characteristics of the tools, construction of the scale and administration of the scale, scoring of the scale, for data validity, a description of the data collection procedures and statistical techniques employed for analysis of data.

3.1 Research Methodology employed for the study

3.1.1 Research Type

According to De Vos (2012), the intervention research is conducted when something new is created and then evaluated. She further states: “….it is a new technology or intervention, an innovation, while programme evaluation as “mere” programme evaluation assumes the prior existence of a programme or intervention designed and developed by someone else, perhaps long before the evaluator ever entered the field” (as cited in Bender C. J. G., 2002:13). This research was focused on designing and developing a programme; and finding out its effectiveness, therefore, research type is Intervention Research.
According to Travers (as cited in Best J. W., 2006:22) “applied research is undertaken to solve an immediate practical problem and the goal of adding to scientific knowledge is secondary.” Applied research is concerned with using the knowledge acquired through research to contribute directly to the understanding or resolution of a contemporary issue (Ritchie, J. and Lewis, J., 2003:24). In other words, applied researches are conducted to test the theoretical concepts in problem situations. The present research attempted to find out the effectiveness of the developed programme, based on life skills theories, in terms of performance of subjects that tends to generalization to research population. Therefore it is referred as Applied Research too.

Also experimental research needs to be completed in a controlled environment in which the researcher collects data and results. The study either accepts or rejects the hypothesis in the light of data analyses. This method of research is also referred as Hypothesis Testing/Evaluation Research.

3.1.2 Research Method
There are various types of methods used based on the purpose of the researches. Thus, the researcher must mention what method/methods of research is/are used in the research with appropriate rationalization for using them. The various methods used are stated as follow:

1. Quantitative methods
   - Descriptive research method
   - Experimental method- involves random assignment of subjects among groups on various conditions and analysis between groups;
   - Quasi-experimented method;
   - Causal-comparative research;
   - Evaluation research method - school surveys, follow up studies;
   - Assessment research method - surveys, public opinion polls, assessment of educational achievement.

2. Qualitative methods
   - Ethnography;
   - Phenomenology;
   - Narrative research;
• Grounded theory;
• Symbolic interaction;
• Case study;
• Content analysis- data are collected through the interviews and questionnaires and the information gathered are analyzed using systematic approaches;
• Archival/historical research method- information are collected through a variety of past records such as biographies, memoirs and news release;
• Life history- study of the personal life through interviews

Experimental Research uses four levels of measurement:

i. A Nominal scale- measures differences between things by assigning them to categories. It is the least precise method of quantification.

ii. An Ordinal scale – ranks items/individuals from highest to lowest. Sometimes it doesn’t only indicate the things differ but they differ in amount or degree.

iii. An Interval Scale – It is an arbitrary scale based on equal units of measurements indicates how much of given characteristics is present. It is more advantageous over nominal and ordinal scales as it indicates the relative amount of a trait or characteristic.

iv. A Ratio Scale - has the equal interval properties of an interval scale.

The study used quasi-experimental method and used five point Likert type Life Skills Scale. When the study doesn’t follow random selection and assignment of subjects for the groups and the dependent variable measured are on an ordinal scale, measures of statistical significance for collected data were restricted to the non-parametric methods.

3.1.3 Research Design

Experimental Design is a sketch of methods and procedures that make possible for the researcher to test the hypotheses to find the relationships between independent and dependent variables and to reach at valid
conclusions. The selection of research design depends upon the purpose of the experiment and the type of variables.

According to Gay and Airasian (2000) (as cited in Best J.W., 2006:29), “A design is a general strategy for conducting a research study. The nature of the hypothesis, the variables involved, and the constraints of the real world all contribute to the selection of design.”

As pointed out by Seliger and Shohamy (1989) “the experimental research is carefully constructed so that variables can be controlled and manipulated.” In other words, an experimental research design involves manipulating the independent variable and observing the change in the dependent variable(s).

To investigate the effectiveness of the Life Skills Programme for enhancing life skills of pre service teachers, a research design which tested the given hypotheses in a controlled context such as an experiment was required.

Basically the three types of designs are:

1. Pre-experimental design
2. True experimental design
3. Quasi-experimental design

A true experimental design consists of three essential characteristics; the presence of a control group, randomization of the participants while selecting sample and their assignment to groups and pre-testing to both groups to measure prior differences in the groups. However, adopting true experimental design and assuring to fulfil the all three basic characteristics may not always be possible, when the researches focus on learning behaviours or skills enhancement. Also in classroom research, it would be desirable to assign random subjects to both experimental and control groups. However because of administrative limitations, at times intact groups must be used. In accordance with the pre requisite of the study, a descriptive design with a quasi-experiment; The Pre-test Post-test Nonequivalent Experimental Control Group Design was adopted. This research design looks very similar to the true experimental design except that there is no randomization of the subjects among the groups. But with non-probability sampling also the similarity of groups on relevant variables or characteristics is possible. Indeed, with quasi-experimental designs, the confidence that can be placed in the validity of
results depends in large part on the case that can be made for the similarity of the groups (Wiersma W. And Jurs S., 2009:167).

The Pre-test Post-test Non-equivalent Experimental Control Group Design can be diagrammed as follows:

```
E    T_{1E}  X  T_{2E}  
C    T_{1C}  -  T_{2C}
```

Where, \( T_{1E} \) = Measurement of the dependent variable for experimental group;
\( X \) = Independent variable, the intervention programme (Life Skills Programme);
\( T_{2E} \) = Measurement of the dependent variable for experimental group;
\( T_{1C} \) = Measurement of the dependent variable for control group; and
\( T_{2C} \) = Measurement of the dependent variable for control group

The design indicates that Life Skills Scale at the beginning on both groups to access pre-status of life skills among participants, under consistent conditions, prior to conducting the experiment, followed by the treatment, that is, the Life Skills Programme. After administering of Life Skills Scale, one group receives the experimental treatment in the form of LSP and another group, serving as a control group, receives the Life Skills Theoretical Orientation through conventional method. Any treatment measures outcomes both before and after the intervention, thus representing the corresponding impact as a change in outcome. Both groups were given Life Skills Scale at post-phase at the same time, shortly after the experimental treatment is completed for experimental group. The Life Skills Scale in the beginning greatly aids for baseline-pre assessment to find out what the learners already know and can exhibit and is carried out in the beginning of the intervention (LSP). The life skills scores on selected variables were measured to assess whether it had a strong relationship with the dependent variable.

### 3.1.4 Population and Sampling

3.1.4.1 Population

According to Lokesh Kaul (1997:111), “A population refers to any collection of specified group of human beings or non-human entities such as objects,
educational institutions, time units, geographical areas, prices of wheat or salaries drawn by individuals. Some statisticians call it universe.”

Bless and Higson-Smith (1995:85) states “that the entire group of people who are the object of research and about whom the researcher wants to establish some characteristics is called the population”.

All the B.Ed. Colleges affiliated to Veer Narmad South Gujarat University constituted a population for the present study.

3.1.4.2 Sample/Participants
A sample is a subset of the population to which the researcher intends to generalize the results (W. Wiersma and S.G. Jurs; 2009:325). For the present study, a researcher used purposive sampling, which comes under non-probability sampling. It is also known as selective, judgemental or subjective. The main aim of purposive sampling is to focus on particular characteristics of a population that are of interest, which will best enable you to answer your research questions. The purpose of the present study is to evaluate the Life Skills Programme on target sample i.e. pre-service teachers. Also because of administrative limitations in randomly selecting and assigning subjects to experimental and control groups, use of probability sampling was not possible.

The limitation of the non-probability sampling is that it makes generalization of the research results risky (Bless & Higson-Smith, 1995, p. 95). Patton (1990) and Gabor (1993) too support this fact. But that was not a major concern as the current study is aimed to design, develop and improve programme effectiveness in a specific context that is supported by Marlow (1993), says that non-probability sampling is often used when the researcher wants to evaluate social work practice.

Two B.Ed. colleges affiliated to Veer Narmad South Gujarat University (VNSGU) were selected by purposive sampling. All the pre-service teachers of those selected B.Ed. colleges constituted the sample. Vivekananda College for B.Ed., Jahangirpura, Surat was considered as Experimental group and S.R.Patel College of Education, Palanpur Jakatnaka; Surat was considered as Control group.
The details of the selected sample are given as under in Table 3.1 on next page.

Table 3.1
Sample for the Main Study

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of the College</th>
<th>No. of Pre-service teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Vivekananda College for B.Ed., Jahangirpura, Surat (considered as Experimental Group)</td>
<td>41</td>
</tr>
<tr>
<td>2.</td>
<td>The S.R. Patel College for education, Palanpur Patia, Surat (considered as Control Group)</td>
<td>46</td>
</tr>
</tbody>
</table>

Table 3.2 represents sample colleges and sample number of pre-service teachers for the study. All the pre-service teachers of those selected B.Ed. colleges constituted the sample. Total 87(41 + 46) pre-service teachers were constituted the sample for main study.

3.1.5 Specifications of Variables of the study

The experimental design, as stated earlier, explores the strength of relationship between variables.

Variables are the conditions or characteristics that the experimenter manipulates controls or observes (Huges, 1990). According to Nunan (1992), “the variable that the experimenter expects to influence the other is called the independent variable”. There are two types of independent variables: treatment and attributed variables. Treatment variable are those factors that the experimenter manipulates and to which he/she assigns subjects. Attribute variables are those characteristics that cannot be altered by the experimenter. It is also termed as major variable that the researcher desires to investigate. In this study, the treatment variable was ‘The Life Skills Programme’ to enhance life skills which was exposed to the pre-service teachers of experimental group whereas the traditional method was used for the control group.
And the attributed variables decided for the present study were gender (female/male), the area they come from (rural/urban), the discipline they opted at higher-secondary school level (Arts/Science/Commerce) and the educational qualification of the pre-service teachers (UG/PG).

About dependent variable, Nunan says that “The variable upon which the independent variable is acting is called the dependent variable”. It is the variable which the researcher monitors and measures to decide the effect of the independent variable. The dependent variable in the present study were life skills scores of pre-service teachers, measured on Life Skills Scale and Situational test at pre-phase and post-phase of the intervention, with respect to gender, the area they belong to, the discipline they opted at higher-secondary school level and educational qualification of the pre-service teachers.

Details of the variable were explained in table no. 3.2.
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Variables</th>
<th>Types of Variable</th>
<th>Levels of Variable</th>
<th>Specifications of Levels</th>
<th>Tools for Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Life Skills Programme</td>
<td>Independent – Treatment</td>
<td>1</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Gender</td>
<td>Independent- Trait</td>
<td>2</td>
<td>Female Male</td>
<td>Information Schedule</td>
</tr>
<tr>
<td>3.</td>
<td>Area</td>
<td>Independent Trait</td>
<td>2</td>
<td>Rural Urban</td>
<td>Information Schedule</td>
</tr>
<tr>
<td>4.</td>
<td>Discipline</td>
<td>Independent Trait</td>
<td>3</td>
<td>Arts Commerce Science</td>
<td>Information Schedule</td>
</tr>
<tr>
<td>5.</td>
<td>Educational Qualification</td>
<td>Independent Trait</td>
<td>2</td>
<td>Bachelor Degree-UG Master Degree-PG</td>
<td>Information Schedule</td>
</tr>
<tr>
<td>6.</td>
<td>Enhancement of Life Skills in Pre service teachers with respect to gender, area, discipline, educational qualification</td>
<td>Dependent</td>
<td>-</td>
<td>Measures the effects of independent variable (performance of subjects of experimental group on Life Skills Scale before and after the LSP)</td>
<td></td>
</tr>
</tbody>
</table>
3.1.6 Hypotheses for the Study

The following hypotheses were tested to evaluate the effectiveness of Life Skills Programme (LSP) among pre-service teachers.

**Hypothesis framed by considering Scores on Situational Test**

**H\textsubscript{01}** There will be no significant difference in pre situational scores and post-situational scores between pre-service teachers who participated in the programme and who did not.

**H\textsubscript{02}** There will be no significant difference in pre situational scores and post-situational scores between pre-service teachers who participated in the programme and who did not, with respect to gender.

**H\textsubscript{03}** There will be no significant difference in pre situational scores and post-situational scores between pre-service teachers who participated in the programme and who did not, with respect to area.

**H\textsubscript{04}** There will be no significant difference in pre situational scores and post-situational scores between pre-service teachers who participated in the programme and who did not, with respect to discipline.

**H\textsubscript{05}** There will be no significant difference in pre situational scores and post-situational scores between pre-service teachers who participated in the programme and who did not, with respect to educational qualification.

**Hypotheses framed by considering Scores on Life Skills Scale**

**H\textsubscript{06}** There will be no significant difference in pre life skills scores and post life skills scores between pre-service teachers who attended the programme and who did not.

**H\textsubscript{07}** There will be no significant difference in pre life skills scores and post life skills scores between pre-service teachers who participated in the programme and who did not, with respect to gender.

**H\textsubscript{08}** There will be no significant difference in pre life skills scores and post life skills scores between pre-service teachers who participated in the programme and who did not, with respect to area.

**H\textsubscript{09}** There will be no significant difference in pre life skills scores and post life skills scores between pre-service teachers who participated in the programme and who did not, with respect to discipline.
There will be no significant difference in pre life skills scores and post life skills scores between pre-service teachers who participated in the programme and who did not, with respect to educational qualification.

### 3.1.7 Tools for Data Collection for the study

This phase of research process was centred on selecting suitable data collection tools and development of research tools.

The research tools used for data collection were:

1. Primary Research Instruments: used to determine the effectiveness of the programme to enhance life skills of the pre-service teachers.
   - a. Life Skills Scale (administered as pre-phase and post-phase of the LSP),
   - b. Situational Test.

2. Secondary research tools: used to appraise the impact and views about programme effectiveness from participants (pre-service teachers)
   - a. Programme Feedback Questionnaire,
   - b. Focussed Group Discussion, and
   - c. Field Notes and Participative Observations.

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Tools Used</th>
<th>Purpose of the tool</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective 1:</strong> To identify the level of life skills among pre-service teachers.</td>
<td>➢ Life Skills Scale at Pre-phase</td>
<td>➢ Used for pre-assessment to assess the life skills levels of pre-service teachers before intervention by rating themselves (self-assessment).</td>
</tr>
<tr>
<td><strong>Objective 2:</strong> To design and develop a Life Skills Programme for pre-service teachers.</td>
<td>➢ Treatment: Life Skills Programme</td>
<td>➢ Used as an intervention to develop and enhance life skills among pre-service teachers.</td>
</tr>
</tbody>
</table>
| Objective 3: To study the effect of a Life Skills Programme on pre-service teachers’ life skills. | Life Skills Scale at post-phase  
- Situation test | Used for post assessment - to assess the level of life skills of pre-service teachers after the intervention by rating themselves after intervention (LSP)  
- Used for pre and post-assessment through their responses in real life situations and conceptual understanding of life skills. |
|---|---|---|
| Objective 4: To study the effect of a life skills programme on pre service teachers’ life skills with respect to their gender, region and discipline. | Information Schedule  
- Life Skills Scale as Post test  
- Situational test | To get information about demographic details, information schedule was used.  
To evaluate the effectiveness of the LSP after intervention, both LSS and situational test were used. |
| Objective 5: To find out the opinions of pre-service teachers | Programme Feedback Questionnaire  
- Focussed Group | Both tools were prepared and used by the researcher to ask opinions and |
A detailed description of each instrument is given below.

3.1.7.1 Life Skills Scale (used as pre-phase assessment and post-phase assessment)

- **Need of the tool - Life Skills Scale**

As emerged from the review of studies conducted in the area of life skills, though the sufficient theoretical frame-work was available on life skills education, there are very few standardized and scientific Life Skills Assessment Scales. And hence the need was realized for devising a multi-dimensional Life Skills Measurement Scale to assess the life skills. Further, for interventional purposes, the need for a life skills assessment tool was required to assess the level of life skills prior the intervention and also to measure the post-intervention life skills level and hence to measure the effectiveness of the intervention. Also it would be helpful for need analysis and to provide with the participants a need based intervention. The present study explored the Life Skills Scale to measure the level of life skills among the pre-service teachers.

The term “scaling” is applied to the procedures for attempting to determine quantitative measures of subjective abstract concepts (Kothari R., 2004:77). Phillips B. (1971:205) defines the term “scaling” as a “procedure for the assignment of numbers (or other symbols) to a property of subjects in order to impart some of the characteristics of numbers to the properties in question”.

To measure the life skills level of pre-service teachers, the researcher considered Life Skills Scale as valid tool as the pre-service teachers had to rate their responses/opinions/behaviours on the items on Life skills Scale by themselves. According to Jordan, Franklin and Corcoran (1993), “Self-ratings are helpful because individuals can evaluate their own thoughts, behaviour
and feelings accurately, provided that they are self-aware and willing to be truthful (as cited in Bender CJG and Lombard A., 2004:94)”.

Patton (1987) describes statements in two types, one as feeling questions and the other as experience/behaviour questions. Feeling questions are designed to know the emotional responses of a person to their experiences and thoughts. And the other types of statements are designed to evoke responses about their experiences, behaviours, actions and activities of persons while facing certain situations. The researcher should have clear understanding about what he wants to measure and the choice of statements.

The researcher had constructed a rating scale named Life Skills Scale on the basis of five point Likert Type Scale, which is the most widely used approach. The rating scale involves qualitative description of a limited number of aspects of a thing or of traits of a person.

- Characteristics of the tool
As mentioned above, the rating scale involves qualitative description of a limited number of aspects of a thing or of traits of a person. The Scale is a well-ordered, well-organized, one dimensional scale on which respondent indicates/decides on one agreement/opinion to a statement/item that best support with their views. The scale can also be four points scale, five points scale; six points scale and so on. The drawback of even numbered scale is that it generally compels a respondent to select any of the opinion while the odd numbered scale has options to respond for uncertainty or indecision. The items were written in the form of qualitative description of traits (in the form of attributes of core life skills) of a person with five-point scale. The scale was developed to measure the life skills level (how much you know about yourself with regard to life skills and how much do you practice them in real life) related to each life skill of pre-service teachers. The Life Skills Scale administered at pre-phase to assess the level of life skills in terms of what the learners know and can exhibit about each life skill. It is also carried out at the end (post-phase) to measure the enhancement of life skills (as evident through
the difference in pre life skills scores and post-life skills scores) among pre-service teachers.

*Construction of the Tool*

To get clarity about choice of the statements/items included in Life Skills Scale, the researcher carried out the review of content on core life skills as mentioned in Chapter Two. The Life Skills Scale included 138 statements in the primal form which was divided in ten subcomponents (ten areas of life skills). The items/ were presented in terms of indicators/traits/constructs related to each area of life skills. The compiling of the statements for instrument was done by kept in mind the learning outcomes of the Life Skills Programme targeted to enhance level of core life skills. It also helped the researcher to take into consideration that the learners in outcomes-based education should be able to assess themselves (Morganett, 1994; Division of Mental Health WHO, 1994; Department of Education, 1999). All the items/statements of the scale were placed in line with the learning outcomes of the Life Skills Programme.

Process of constructing the Life Skills Scale:

1. Studying and analyzing the available literature on life skills, life skills and its traits/indicators, research studies conducted in the area of life skills, various scales, various documents and holding discussion held with experts in the field to construct life skills,
2. Collecting large numbers of statements depicting the life skills practices,
3. Scaling the statements on five points i.e. ‘1-nil’, ‘2-little’, ‘3-satisfactory’, ‘4-much’ and ‘5-most’,
4. Establishing the validity of pilot form of Life Skills Scale by experts,
5. Selecting the sample for administration of the pilot form of the scale,
6. Administrating the scale,
7. Finalizing the Life Skills Scale.
8. Establishing the validity and Reliability of Life Skills Scale
1. Studying and analyzing the available literature on life skills
The researcher analysed the available literature and documents on measurement of the life skills and also discussed with the experts in the field. There are ten core life skills recommended by WHO. For each Life skill about ten to fifteen behavioural statements were constructed. These statements were related to the awareness of themselves regarding life skills and their practice in daily life situations and challenges. The researcher constructed 138 statements on life skills practices in the preparatory form.

2. Collecting large numbers of statements depicting the life skills practices
Then the instrument was tested in terms of its face and content validity as it was given to the experts consisting of distinguished and experienced personnel in the field of education, life skills and research. Statements were discussed; opinions and suggestions of experts were considered for giving the final shape.

3. Scaling the statements on five points
The participants were asked to read the statements and put a tick mark at the number how they rated their life skills on an ordinal scale from 1 to 5 as ‘1-nil’, ‘2-little’, ‘3-satisfactory’, ‘4-much’ and ‘5-most’.

3. Establishing the validity of pilot form of Life Skills Scale by experts
Content validity is an important aspect of developing tools that can help researchers understand and treat behavioural and mental health conditions. It is essential to find out if the data collection procedure is a good representation of the content which needs to be measured (Seliger and Shohamy, 1989). The investigator talked with the experts about the content of the scale.

5. Selecting the sample for administration of the pilot form of the scale
As indicated earlier, the procedures followed in designing the Life Skills Scale (Pre-test and post-test) helped in identifying the difficulties that the respondents might face when those tools would be administered to them. In connection with the significance of piloting the tools, Cohen, Manion and
Morrison (2007) citing different scholars (for example, Oppenheim, 1992; Morrison, 1993 and Wilson and McLean, 1994) list several advantages of piloting the tools and the programme, some of which are listed here:

- to check the clarity of items, instruction and layout
- to gain feedback on the validity of the items
- to eliminate ambiguities or difficulties in language
- to check readability level for the target audience
- to get feedback on the types of items/questions, to identify ambiguous/incorrect items and to omit such items/questions

For the pilot administration of the scale, fifty pre-service teachers of B. Ed. colleges of VNSGU, Surat were purposively selected as sample for the pilot testing of Life Skills Scale.

6. Administration of the pilot form of the scale

The pilot administration of the scale was conducted on fifty pre-service teachers of B.Ed. colleges of VNSGU. The time was recorded for completing of life skills scale for deciding the time limit. Considering it, 60 minutes was decided for final form of Life Skills Scale. Further several informal discussions were held with most of the participants to ask for their opinions and elicit responses about items on scale. These discussions during pilot testing helped the researcher to detect the errors and limitations.

The opinions and observations were drawn from pilot testing:

1. Instructions were not clear to them.
2. The language needs to keep simple and clear.
3. Time to fill up the Life Skills Scale needs to be increased.

By considering pilot subjects’ responses and investigator’s participative observations during pilot testing of the life skills scale, the suggested changes were made.

7. Arriving at a final form of the Life Skills Scale

The insights and suggestions gained from the processes of validation and piloting of the preliminary form were the basis for shaping and modifying the life skills scale. By following the all above mentioned steps, the researcher
had arrived at the final form of Life Skills Scale. Final form was consisting information schedule, confidentiality statement, general instructions guiding on how to respond the items on the scale and then it was followed by the items representing the life skills traits on which the respondents have to rate their opinions. The final form of Life Skills Scale (LSS) was consisted of 125 items/statements. These 125 items/statements were grouped and divided into ten areas/dimensions i.e.: Self Awareness, Interpersonal Skill, Critical Thinking Skill, Decision Making Skill, Empathy, Effective Communication Skill, Creative Thinking Skill, Problem Solving Skill, Coping with Stress, and Coping with Emotions. The scores attained under each area represent the level of life skills in the respective area. The scores range from 125 to 625 for the whole scale, higher the scores is the indicator of high life skills level and lesser the scores is the indicator of low life skills level. The scale had 125 statements. The final form of Life Skills Scale placed in Appendix I. The table below represents the areas of life skills, serial numbers depicting items related to each area and total number of items included in the final form of Life Skills Scale.

Table 3.4 Areas of Life Skills, items in each area/dimension and total no. of items

<table>
<thead>
<tr>
<th>Areas/ No. of Items</th>
<th>Serial Numbers of Items In the Final Scale</th>
<th>Total No. of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-awareness Skill</td>
<td>1,2,3,4,5,6,7,8,9,10,11,12,13,14,15</td>
<td>15</td>
</tr>
<tr>
<td>Interpersonal Skill</td>
<td>16,17,18,19,20,21,22,23,24,25,26,27,28</td>
<td>13</td>
</tr>
<tr>
<td>Critical Thinking Skill</td>
<td>29,30,31,32,33,34,35,36,37,38,39,40</td>
<td>12</td>
</tr>
<tr>
<td>Decision Making Skill</td>
<td>41,42,43,44,45,46,47,48,49,50</td>
<td>10</td>
</tr>
<tr>
<td>Empathy</td>
<td>51,52,53,54,55,56,57,58,59,60</td>
<td>10</td>
</tr>
<tr>
<td>Effective Communication Skill</td>
<td>61,62,63,64,65,66,67,68,69,70,71,72</td>
<td>12</td>
</tr>
<tr>
<td>Creative Thinking Skill</td>
<td>73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89</td>
<td>17</td>
</tr>
</tbody>
</table>
8. Validity and Reliability Measures of Life Skills Scale

Validity Analysis of Life Skills Scale:
According to Guilford (1956), “The validity of a test or of any measuring instrument depends upon the fidelity with which it measures what it proposes to measure”.

The Validity of the Life Skills Scale was determined in terms of face validity and item analysis methods. The face validity of the Life Skills Scale was found to be high as items prepared were given to experts in the area of Life Skills. Content validity is mainly measured by relying on the knowledge of subject-matter experts who have the in-depth knowledge with the construct being measured. The experts are usually asked to provide feedback on the subject-matter of measurement tool to determine the content validity of the test. They are asked to reflect on how well each question measures the construct. Their opinions, reviews and comment/feedback were then analyzed. Items with highest agreement by judges were included in the scale. Thirteen statements were found irrelevant and were removed from the life skills scale. The other changes suggested were mainly structural and linguistic. Considering the suggestions, changes were made and at the end total 125 statements were finalized for the Life Skills Scale for pilot testing.

Reliability analysis of Life Skills Scale:
According to Antasi & Urbina (2002:), "Reliability refers to the consistency of scores obtained by the same persons when they are re-examined with the same test on different occasions, or with different sets of equivalent items, or under other variable examining conditions". There are four methods of establishing the reliability of a test. They are:

<table>
<thead>
<tr>
<th>Problem Solving Skill</th>
<th>90,91,92,93,94,95,96,97,98,99,100,101</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coping with Emotions</td>
<td>115,116,117,118,119,120,121,122,123,124,125</td>
<td>11</td>
</tr>
</tbody>
</table>
i. Test - retest method
ii. Alternate or parallel form
iii. Split half method
iv. Rational equivalence method

Cronbach’s Alpha- Reliability Test and Test-Retest Reliability were run to measure the internal consistency of items in the scale. The SPSS (version 15.0) was utilized to measure the Cronbach's Alpha co-efficient and split-half reliability co-efficient.

A researcher has devised a Life Skills Scale including 125 items. These 125 items/statements were grouped and divided into ten dimensions. Joseph-Rosemary (2003) specifies that the value of Cronbach’s Alpha Co-efficient normally falls within the range zero and one. The closer the alpha co-efficient, the greater the internal consistency of the items in the scale. The formula used to find out the Cronbach's Alpha co-efficient is: \[ \text{Cronbach's Alpha} = \frac{rk}{11 + (k-1)r} \].

The rules of thumb to infer the Cronbach's Alpha co-efficient is: _>.9 - Excellent, _>.8 - Good, _>.7 - Acceptable, _>.6 - Questionable, _>.5 - Poor, _<.5 - Unacceptable. Cronbach's Alpha for the Life Skills Scale was carried out among the items and the alpha co-efficient was calculated. The Cronbach’s alpha resulted in an overall score of 0.697 indicating internal consistency of the items, which is considered as acceptable.

Test-Retest reliability is also one of the methods to measure internal consistency. Test-retest reliability of the Life Skills Scale was found out. The scale was administered twice with a time interval of fifteen days to a sample of sixty pre-service teachers of B.Ed. Colleges of Veer Narmad South Gujarat University. The reliability coefficient was found to be 0.782, computed using Product Moment Correlation method.

3.1.7.2 Situational Test

Situational Test was constructed by the investigator researcher to evaluate effectiveness of the developed programme in addition to Life Skills Scale. It comprises of 30 test items, incorporating conceptual understanding of core life skills and its practical usability in real life. All the items in the test were mixed form of open and close ended questions. Some of them are direct questions
and some are situation based questions. The test items including direct questions were used to check the understanding of core life skills. And the other types of questions/statements are designed to describe their usability of life skills in real life and to evoke responses about their experiences, behaviours, actions and activities of persons while facing such situations in real life. Some of situation based test items consist of a stem (question) and three/four alternatives (responses), in which one was the most appropriate answer and one most inappropriate answer; whereas some of situation based test items have only one right answer and the others were distracters. The situational test was developed in English and later translated in Gujarati, were also evaluated and modified by experts. The Gujarati version of Situational test was presented in appendix III. The answer key of situational test was developed and used to measure the responses of the pre-service teachers, is presented in appendix IV.

A good test requires adequate, detailed and extensive planning. The important points need to be considered while constructing a test:

(i) The subject-topic and grade of target sample
(ii) Content Analysis for the Situational Test
(iii) Weightage to content units
(iv) Weightage to objectives
(v) Preparation of the blue print Validity of the Situational test
(vi) Test-length, time, maximum marks, instructions for answering and scoring procedures of the test
(vii) Piloting a Situational Test and evolving its final form

The details of each point are given below

(i) Subject and grade of the test- The situational test was constructed to measure the enhancement in life skills for pre-service teachers of the VNSGU.

(ii) Content Analysis
Content Analysis was carried out to decide the content for the Situational Test and was presented in the table 3.5.
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Content</th>
<th>Sub content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Concept of Life Skills</td>
<td>1. Meaning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Definitions of Life Skills given by different organizations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Need and Importance of Life Skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Classification of life skills according to various models</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Core Life Skills suggested by WHO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. Methods and techniques to impart life skills</td>
</tr>
<tr>
<td>2.</td>
<td>Self awareness Skill</td>
<td>1. Meaning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Definitions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Importance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Indicators</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Aspects of Self-awareness skill</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. Methods and techniques to improve self awareness skill</td>
</tr>
<tr>
<td>3.</td>
<td>Interpersonal Skill</td>
<td>1. Meaning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Definitions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Process-Stages of relationship according to the Model of George Levinger (1983)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Characteristics of a person having good interpersonal skill</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Methods and techniques to enhance interpersonal skills</td>
</tr>
<tr>
<td>4.</td>
<td>Effective Communication Skill</td>
<td>1. Meaning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Definitions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Communication Skill as a combination of other skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Components of Communication Process</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Explanation of Communication Process</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. Characteristics of an Effective Communicator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7. Methods and techniques to enhance effective communication skills</td>
</tr>
<tr>
<td>5.</td>
<td>Problem-solving Skill</td>
<td>1. Meaning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Definitions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Characteristics of a good problem solver</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Methods and techniques to enhance effective problem solving skills</td>
</tr>
<tr>
<td>6.</td>
<td>Decision making skill</td>
<td>1. Meaning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Importance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Process-Stages of Decision Making</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Characteristics of a good decision-maker</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Methods and techniques to improve</td>
</tr>
<tr>
<td>Sr. No.</td>
<td>Content Units</td>
<td>No. of Questions</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>I</td>
<td>Life Skills- Concept</td>
<td>2</td>
</tr>
<tr>
<td>II</td>
<td>Self awareness Skill</td>
<td>3</td>
</tr>
<tr>
<td>III</td>
<td>Interpersonal Skill</td>
<td>1</td>
</tr>
<tr>
<td>IV</td>
<td>Effective Communication Skill</td>
<td>2</td>
</tr>
</tbody>
</table>

(iii) Weightage to content units

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Objectives</th>
<th>No. Questions</th>
<th>Marks</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Remember</td>
<td>4</td>
<td>8.5</td>
<td>12.14</td>
</tr>
<tr>
<td>2.</td>
<td>Understand</td>
<td>4</td>
<td>11</td>
<td>15.71</td>
</tr>
<tr>
<td>3.</td>
<td>Apply</td>
<td>4</td>
<td>6</td>
<td>8.57</td>
</tr>
<tr>
<td>4.</td>
<td>Analyse</td>
<td>8</td>
<td>22</td>
<td>31.43</td>
</tr>
<tr>
<td>5.</td>
<td>Evaluate</td>
<td>5</td>
<td>15</td>
<td>21.43</td>
</tr>
<tr>
<td>6.</td>
<td>Create</td>
<td>2</td>
<td>7.5</td>
<td>10.71</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>70</td>
<td>100</td>
</tr>
</tbody>
</table>

(iv) Weightage to objectives

Determination of objectives has a significant role in construction of any achievement test. The following objectives were set for testing: i) Remember, ii) Understand, iii) Apply, iv) Analyse, v) Evaluate, and vi) Create. Weightage to different objectives in the test are given in Table 3.7.

Table 3.7 Weightage to Objectives in the situational Test

(v) Preparation of the Blueprint

The blueprint is a three-dimensional table including coverage of content, objectives and type of questions. A blueprint was prepared and discussed with experts. The cell in the blueprint represents the number of items to be included in the test in relation to any particular objective. (Please refer the blueprint of Situational Test in appendix VI).

(vi) Validity of the Situational test

Validity is the quality of the research tool or procedure that measures what it purports to measure. A tool is said to be valid if it possesses content validity, face validity and intrinsic validity.

a. Content Validity Content validity shows the adequacy of the content of a test. The tools used in the present study possess the Content validity. The items in the tools were based on the relevant Literature and consultation with experts in
related field. Their valid suggestions were taken into account while constructing each scale used in the study and hence the tools possess content validity.

b. Face Validity - It refers to the way the test appears to those it is meant for, to experts and educationalists, that is, the test items should be related to the variables being measured. The face validity of the Situational Test was found to be appears high as items prepared were given to experts in the area of Life Skills. They were asked to reflect on how well each question measures the construct. Their opinions, reviews and comment/feedback were then analyzed. Items with highest agreement by judges were included in the scale. Thirteen statements were found irrelevant and were removed from the life skills scale. The other changes suggested were mainly structural and linguistic. The valuable suggestions of experts were incorporated were considered to modify the preparatory form of situational test and the final form of situational test was evolved.

(vii) Preliminary information such as Test-length, time, maximum marks, instructions for answering and scoring procedures of the test

The investigator included thirty items in the final situational test and the time decided to answer the test is sixty minutes. The maximum mark of the test is seventy. The subject is instructed to response as per the instruction for each question in the situational test.

(viii) Piloting a Situational Test and evolving its final form

For the pilot administration of the scale, fifty pre-service teachers of B. Ed. colleges of VNSGU, Surat were purposively selected as sample for the pilot testing of Life Skills Scale. The time was recorded for completing of Situational Test for deciding the time limit. Considering it, 60 minutes was decided for final form of Situational Test. By considering pilot subjects’ responses and investigator’s participative observations during pilot testing of the life skills scale, the suggested changes were made. The insights and suggestions gained from the processes of validation and piloting of the preliminary form were the basis for shaping and modifying the final form of Situation Test. Tasks such as preparation of the blue print, construction of test
items, arranging the written items, printing question papers and response sheets with necessary instructions were carried out in this stage. And the final form of situational test was evolved, which is presented in appendix II.

3.2.7.3. Programme Feedback Questionnaire
Programme Feedback Questionnaire was prepared by the investigator to gain feedback on the Life Skills Programme. Opinions of student teachers were asked to evaluate the programme in the form of open and close ended question forms, which is placed in Appendix III.

3.1.7.4 Focused Group Discussion
It is an act for involving the subjects into a brainstorming session and makes them reflect over the impact of implemented Life Skills Programme. Here the subjects get involved into a kind of discussion that is constructive criticism wherein the researcher acts as guide and monitors the discussion. Focussed Group Discussion can be used to collect information for many purposes, such as conducting a need assessment or evaluating a program. In the present study focused group discussion with focused facilitative questions was carried out to evaluate the programme. Through Focused Group Discussion, opinions of teacher trainees were collected about LSP were collected on how the activities of the LSP helped them to think and reflect for their improvement.

3.1.7.5 Field Notes and Observations
Field Notes were maintained by the researcher; and observations and expressions reflected through focused group discussion, programme feedback questionnaire, observations by the researcher, and the teacher educators’ responses regarding behaviours of pre-service teachers were noted down.

3.1.8 Validity of Experimental Design
Data Validity measures is an important decisive factor for assuring the quality of the data collection procedures for any research. Validity provides information on the extent to which the procedure really measures what it is supposed to measure. The data collection procedures create some effect on the data as it is difficult to say that there are any data collection procedures that do
not affect the data (Seliger and Shohamy, 1999). In other words, all data collection procedures have some effect on the type of data elicited. However, it is more important that the researcher is aware of these effects in explaining the results obtained. “Over the years, researchers have developed a number of techniques to assure the quality of the research and the quality of data collection procedures used in the research” states Seliger and Shohamy (1989:184).

The internal validity refers to the results that are because of the factors that have been selected by the researcher, rather than other factors that the researcher hasn’t controlled. Factors that could influence the internal validity of a research study are usually related to the participants and the instrumentation. The current research has ensured internal and external validity of the study for various aspects of the study.

3.1.8.1 Internal Validity

W. Wiersma (2009); S. G. Jurs (2009, p.139) state that “Internal validity questions whether the experimental treatment really makes a difference in the dependent variable”. Seliger and Shohamy (1989, p.105) note that “the internal validity of a research study concerns with being able to state that relation between the independent and depended variables is unambiguous and not explainable by extraneous variables”. Thus the internal validity refers to the results that are because of the factors that have been selected by the researcher, rather than other factors that the researcher hasn’t controlled. Factors that could influence the internal validity of a research study are usually related to the participants and the instrumentation. The current research has ensured internal validity of the study for various aspects of the study which is mentioned below. As noted by Seliger and Shohamy (1989), the internal validity of the participants in a research study could be affected by various factors such as history, attrition, maturation, Testing, Instrumentation and differential selection.

History: Any study that takes considerable amount of time to complete can be affected by this if care is not taken (Perry, 2005). The shorter the duration of an experiment, the less likely history is to be a threat to validity.
The current study was conducted over a period of three weeks, the 35-hour program, and daily approximately 60-100 minutes; therefore the threat due to the history factor did not exist.

Maturation: The threat related to the maturation of participants is similar to that caused by history, but deals with natural changes taking place over time in the participants such as emotional states, physical coordination and strength, or cognitive structures (Hiradhar, 2012). It is an influencing and significant factor with younger subjects than with older ones (Seliger and Shohamy, 1989). Studies that take place over longer periods of time are potentially subject to this interference. However, this effect of maturation of the subjects was nullified in the present study because it spanned a short period of three weeks only and the subjects were mature as the study was conducted on pre-service teachers.

Testing: The awareness and experience of pre-test and its content serves as the learning experiences and therefore affects the scores of the post test performance. This factor was also controlled as The researcher selected the control group against the experimental group, so the current events created the equal effects to all groups of the experiments. So the effect of pre-test was equal on both groups.

Instrumentation: The research tools used in the study were self-constructed by the investigator and finalized with the help of experts. Further the experiment was implemented by the investigator herself throughout the study. So the effect of instrument decay was also controlled.

Selection of groups: The third factor, differential selection could occur whenever a researcher does not randomly select the samples when forming different groups for comparisons (Perry, 2005). The current study did not use randomly selected subjects and used quasi- experimental design named Non-equivalent Pre-test Post life skills Control Group Design. When the group of subjects are not randomly assigned to groups, group differs in their level. Use
of statistical measures nullifies this effect. Here, non-parametric tests named Mann Whitney U and Wilcoxon signed rank test were used.

**Experimental Mortality:** If the subjects drop out from the experiment on a non-random basis due to any reason, it affects the result automatically. The researcher tried to sustain interest of the subjects and succeed not to decrease the sample size. On the contrary, the subjects were found more enthusiastic and motivated each day to take up next activity of the programme. Hence this effect was also prevented.

**Attrition:** Another factor that may have an effect on the internal validity is attrition. In a longitudinal study that takes extended time to complete research procedures, the subjects may lose interest and drop out or may remain absent due to health problems. To avoid this problem, it is sometimes preferred to begin with a larger than necessary number of subjects. This factor did not affect the results as the programme lasted for three weeks only and the study could retain 41 participants among 46. Therefore 5 participants who were irregular were discarded and were not counted for statistical analysis.

The other factors like consistency of result, expectation, Novelty of the experiment, John-Hennry effect, and Hawthorne effect could not be controlled fully or partially.

3.1.8.2 External validity
About external Validity, W. Wiersma (2009) and S. G. Jurs (2009) state that external validity certainly concerns the populations to which the researcher expects to generalize the results. There may be factors such as size of the class, type of school, and the like, across which the research wants to generalize. In the present study, the external validity of the experiment was controlled with reference to the following factors.

**Multiple Treatment Interference:** When the same subjects receive two or more treatments (as in repeated design). There may be a carryover effect
between treatments such that the results cannot be generalized to a single
treatment. As the present study used Pre-test Post life skills Non-equivalent
Control Group design and each subject of both the groups were assigned only
one treatment.

*Selection treatment interaction:* The selection and random assignment
of subjects to the groups was not possible in this study, the quasi-experimental
design was used and the statistical techniques appropriate to quasi design were
used to adjust differences in groups.

*Effects of Experimental Arrangements:* Both groups were treated in the
same way in terms of arrangements in all respects except the treatment itself.

*Experimenter Effects:* The observations made for Focused group
discussion and field notes were noted by the person other than the researcher
to avoid experimenter biasing.
The other factors like consistency of result, expectation, Novelty of the
experiment, John-Henry effect, and Hawthorne effect could not be controlled
fully or partially.

### 3.1.9 Procedure of Data collection

Mutual consent was taken from the trusties and principal of the
Vivekananda college of Education as the pre-service teachers of this college
were considered as experimental group to carry out intervention. The other
college- The S.R.Patel College of Education was considered as a control
group and the principal of that college was contacted to allow implementing
the Situational Test, Life Skills Scale and the Life Skills Theoretical
Orientation on pre-service teachers of the college. The Situational Test and
Life skills Scale in the beginning was given to both the groups to find out pre-
level of life skills (traits/attributes/constructs) among pre-service teachers.

The pre-service teachers of Vivekananda college of Education
were selected as experimental group. The Principal allotted daily 90-120
minutes for 21 days. Then the developed programme was implemented in
intensive and experiential manner on the experimental group for 35 hours,
daily 90-120 minutes, from 15\textsuperscript{th} July to 8\textsuperscript{th} August, 2015; excluding holidays. A thirty five hour Life Skills Programme was designed, produced and delivered for the present study. A total 35 sessions, were included the implementation of the Pre-test, orientation sessions and actual programme sessions exposing the participants to practice life skills, Life Skills Scale as post assessment, situational test and programme feedback sessions. Each session of the programme was followed by Self-awareness, Exercise/Activity, Discussion, and feedback and Reflect. At the end, Life Skills Scale as post assessment, situational test were administered on both the groups to evaluate the effectiveness of the LSP. In addition, Programme Evaluation Questionnaire and Focussed group discussion were carried out to ask opinions and feedback on the impact of the programme in the form of their experiences, reflections and opinions. (Refer 4.3.8 Life Skills Programme in chapter 4)

The pre-service teachers of The S.R.Patel College of Education were selected as control group and were exposed to Life Skills Theoretical Orientation through conventional approach. The Principal allotted daily 90-120 minutes for 21 days. Life Skills Orientation was given for 30 hours, daily 90-120 minutes, from 15\textsuperscript{th} July to 8\textsuperscript{th} August, 2015; excluding holidays. The outline of Life Skills Orientation was presented in chapter 4 (Refer 4.3.8 Life Skills Programme in chapter 4).

\textbf{3.1.10 Procedure of Statistical Analysis of the Data}
Nonparametric techniques are used when there is a serious violation of the distribution assumptions of parametric tests. These tests are considered as less powerful compared to the parametric tests and appropriate when the data measured are on scales that are not interval or ratio. As non-parametric tests are generally designed for the analysis of nominal or ordinal level data, they are often ideally suited for use in social work research (Weinbach & Grinnell J., 1998: 114). Non parametric statistical tests were employed for the present study as the sample was convenient sample and not randomized; and the data obtained were measured on an ordinal scale. SPSS version 10 was used for data entry and analysis. The following non-parametric techniques were used for data analysis.
3.1.10.1 Mann-Whitney U Test (Wilcoxon rank sum W test)

Mann-Whitney U-test is also known as the Mann-Whitney-Wilcoxon (MWW) or Wilcoxon Rank-Sum Test. Parametric test ‘t-test’ for two samples, is based on the assumptions that the difference between the samples is normally distributed, or that the variances of the two populations are equal. When the validity of the assumptions of t-test is questionable, the Mann-Whitney U-Test is used. The Mann-Whitney Test (M-W) is a useful nonparametric used as an alternative to the two-sample t-test.

- **Conditions of using Mann-Whitney U Test (Wilcoxon rank sum W test)**

  1. When the two data samples are **independent and** if they come from distinct populations.
  2. When the dependent variable is measured on ordinal scale.
  3. If the dependent variable is measured either on ratio or interval, but you cannot assume that the two populations form the normal distribution.
  4. When there is one independent variable that consists of two categorical, independent groups (i.e., a dichotomous variable) include gender (two groups: "males" or "females").

- **Writing hypothesis for Mann Whitney U test**

  1. To state the null and alternative hypotheses for a Mann-Whitney U test, and then state this was accepted and rejected at the end of the experiment.
  2. One such null hypothesis and the alternative hypothesis in case of Mann Whitney U test might be:

    **H₀**: **The distributions of scores for the two groups are equal**
    
    **Hₐ**: the distributions of scores for the two groups are not equal
    
    **Hₐ**: the mean ranks of the two groups are not equal
    
    **Hₐ**: the medians of the two groups are not equal

- **Process of calculating Mann Whitney U test**

  1. Writing the hypotheses:

    \[ H₀: \mu_{Q\text{Prog}} = \mu_{No\text{Prog}} \]
\[ H_1: \mu_{\text{Prog}} \neq \mu_{\text{No Prog}} \]

2. Determine if the hypotheses are one-tailed or two-tailed.

3. Specify the $\alpha$ level: $\alpha = .05$

4. The Mann-Whitney U test ranks each score of the dependent variable (e.g., life skills scores), irrespective of the group it is in (e.g., males or females), according to its size, with the smallest rank assigned to the smallest value. The ranks obtained for males are then averaged, as are the female's ranks. This way mean rank for males and a mean rank for females were found. The null hypothesis of the Mann-Whitney U test checks if the distributions are identical i.e. the mean rank will be the same for both males and females. However, if one group (e.g., females) tends to have higher values than the other group, that group's scores will have been assigned higher ranks and will have a higher mean rank (and vice-versa for the group with lower scores). It is that difference in mean rank, is tested by the Mann-Whitney U test for statistical significance and finally calculates the U value.

5. Compare the U value and its significance p value with significance level at $\alpha$ level: $\alpha = .05$ or $\alpha = .01$

6. And at the end, the null hypothesis is rejected if one group is significantly higher than the other group.

3.1.10.2 Kruskal-Wallis Test

Kruskal Wallis Test is similar to the K samples in which the objective is to check whether the K independent samples are from K identical populations. This is called as H test. This is a non-parametric test which is an alternative to single factor ANOVA (R. Panneerselvam, 2007:350). As same in Mann-Whitney Test, in the Kruskal Wallis Test also all the scores are pooled down together and their ranks are recognized. The smallest value of the score is ranked 1 and the largest value of the score is ranked N. If there is tie, then the ranks of the scores which are having tie, are modified by assigning average
rank as explained in case of Mann Whitney U test. H follows chi square distribution with (K-1) degrees of freedom.

3.3 Conclusion

This chapter described the methodological concerns and data collection and data analysis procedures employed for the present study. The next chapter represents development of Life Skills Programme.