Chapter 3
METHOD AND PROCEDURE

Research designs are plans and procedures for research that span the decisions from broad assumptions to detailed methods of data collection and analysis. It involves the intersection of philosophical assumptions, strategies of enquiry and specific methods (Creswell and Creswell 2017).

In the current study researcher has applied a systematic approach to get reliable, objective and valid results. This adopted procedure of scientific method has been discussed in coming sections in detail.

3.1 Variables involved in the study

A variable refers to a characteristic or attribute of an individual or an organization that can be measured or observed and that varies among the people or organization being studied. A variable typically will vary in two or more categories or on a continuum of scores, and it can be measured (Creswell, 2007).

The present study includes the following variables:

**Independent variables** – These can never get affected by other variables and can stand alone. However these can be a cause of change in other variables for e.g. persons’ behaviour, mental state, knowledge, attitude etc. In the current experimental study, Intentional intelligence intervention was the independent variable. Students were allocated control and experimental groups on the basis of random selections wherein the experimental group was given the 56 days intervention and the control group was debarred from this. The investigator had also taken care of that the control group would not get any kind of treatment during that period to see the effects of both experimental and control groups over dependent variables.

**Dependent variables** – These are the variables being tested. Moreover these are the effect or some change in the selected subjects due to other factors or variables. In the current study the effect of independent variable (Intentional intelligence intervention) was studied on dependent variables- Intentional intelligence, Anxiety, Self esteem and Academic achievement.

**Classifying variable** - The adolescents were classified into two groups of internal and external Locus of control on the basis of the testing done by using Locus of control Scale which was developed by Nowicki and Stickland (1973) and adapted by the researcher herself for the current study.
Extraneous variables- These are the undesirable variables which also affect the dependent variables like independent variables. Although it is not possible to control or eliminate all the interfering factors, yet one can minimize their effects. So it is important to control these variables up to the best, either experimentally or by matching the different groups with respect to these variables.

In the present study type of school, gender, grade, age, socio-economic status, physical environment of the school, duration of the instruction etc were controlled administratively in a successful manner. Random sampling was done in order to have true representative data. Investigator ensured that the size, treatment and time duration of the sessions and the total duration of the intervention was properly equated for both control group as well as experimental group so that they will not intervene and affect the results of the present investigation. The extraneous variables intervening in this study were controlled in a following manner:

- Type of School
  The sample for the current study was collected from Government schools of Chandigarh. So these schools have more or less same physical facilities, infrastructure and equipments.

- Age
  The age of the adolescents in both experimental as well as control group was ranging between 14-16 years.

- Grade
  The sample of the study comprised of IX graders studying in Government schools of Chandigarh.

- Gender
  Both male and female IX graders were included in the sample.

- Socio-Economic Status
  The Socioeconomic data of the students comprising the sample were obtained from the school records. It was found that the present sample belong to lower and below poverty line society.

3.2. Research Method and design

Research is a scientific enquiry so cannot be thought of proceeding haphazardly. Any study without proper planning mostly yields fruitless results. Research design is much more specific than a mere plan. It not only includes the methods and procedures for selecting
techniques, data collection and analysis to reach the results but also provides guidelines to tackle the problems if comes on the way of reaching the conclusions. It specifies the research plan with strategy; what to be collected, which procedure is to be followed, techniques to be adopted and identifying the source. A study planned with a proper research design and executed accordingly always comes out to be a hit with reliable data and accurate results. It directs a researcher to proceed without being baffled with the associated events. Research design is a blue print which contains a proper planned strategy and a systematic structure with procedures to be followed to find the valid answers or conclusions for the research questions. The plan is an overall scheme or programme of research. It includes an outline of what the investigator will do from writing the hypothesis and their operational implications to the final analysis of data (Kerlinger, 1973).

Research Method is a systematic approach that determines the testing. It draws the footprints of the various steps to be followed by the researcher in the research process. It facilitates the researcher in the choice of data gathering tools, the collection, analysis and interpretation of data, and the process of drawing inferences and generalizations. The present study was aimed at finding the effect of Intentional intelligence intervention program on anxiety, Self esteem and academic achievement among adolescents in relation to their Locus of control. There are various methods and procedures which can be adopted for any research project. But for the present study, experimental method was found to be appropriate. Selection of research problem is followed by collection of data. This has an utmost importance in research as the relevant data both in quality as well as quantity can only be collected if proper and appropriate method is applied. If this is not followed, the results may come fruitless being illogical and without any proper scientific grounds. So it is important to adopt a systematic approach in a research project. Quantitative research is a means for testing objective theories by examining the relationship among variables. These variables, in turn, can be measured. Typically on instruments, so that numbered data can be analyzed using statistical procedures. The final written report has a set structure consisting of introduction, literature, theory, methods, results and discussion (Creswell, 2008).

Pre- test post- test control group design was employed and random allocation of the subjects was done while forming the two groups. Intentional intelligence intervention and the Locus of control were the two independent variables. When two or more independent variables are used in any experiment, the researcher has to resort to factorial design (Weiner, Schinka and Velicer 2003). A factorial design is the one in which the researcher manipulates two or more
variables simultaneously in order to study the independent effect of each variable on the
dependent variable, as well the effects caused by interactions among the several variables
(Ary, Jacobs, Razavieh and Sorensen, 2009). In the current study, main and interaction effects
of the variables were studied by employing 2X2 factorial design.

To study the gains on Anxiety, the difference between pre test post test scores were studied
through 2X2 factorial design. The Intentional intelligence intervention and Locus of control
were independent variables whereas scores on anxiety was considered as dependent variable.
Figure 3.1 below presents the 2X2 factorial design for mean gain scores on Anxiety of adolescents

![Figure 3.1: 2X2 factorial design for mean gain scores on Anxiety](image)

Figure 3.1: 2X2 factorial design for mean gain scores on Anxiety

Another 2X2 factorial design was employed to study the gains on Self esteem of adolescents.
Here also, Intentional intelligence intervention and Locus of control were independent
variables and scores on Self esteem was considered as dependent variable. The schematic
layout of this 2X2 factorial design is summarized below in figure 3.2.

![Figure 3.2: 2X2 factorial design for mean gain scores on Self esteem](image)

Figure 3.2: 2X2 factorial design for mean gain scores on Self esteem
Third 2X2 factorial design was used to analyze mean gain scores on Academic achievement of adolescents. Same as above, here also, Intentional intelligence intervention and Locus of control were the two independent variables and scores on Academic achievement was considered as dependent variable. Figure 3.3 below summarizes the 2X2 factorial design for mean gain scores on Academic achievement.

![Diagram of 2X2 factorial design]

**Figure 3.3: 2X2 factorial design for mean gain scores on Academic achievement**

### 3.3. Sample and Sampling technique

Population constitutes exhaustive collection of people or things possessing similar characteristics. We usually find it impractical, if not impossible, to conduct research on entire population. So, we consider a sample (a representation of the population), and obtain measurements or observations from this sample (the sample data), and then use statistics to make an inference about the entire set of values. Population and sample enjoys a give and take relationship whereby sample is formed from the population and in return conclusions are taken or drawn from the sample generalizable to the population. “A sample is a finite part of a statistical population whose properties are studied to gain information about the whole. When dealing with people, it can be defined as a set of respondents (people) selected from a larger population for the purpose of a survey. A population is a group of individuals persons, objects, or items from which samples are taken for measurement for example a population of presidents or professors, books or students” (Webster, 1985). “A sample design is a definite plan for obtaining a sample from a given population. It refers to the technique or the procedure the researcher would adopt in selecting items for the sample. Sample design may as well lay down the number of items to be included in the sample i.e., the size of the sample. Sample design is determined before data are collected” (Kothari, 2004).
“Sampling is the process by which a relatively small number of individuals or measures of individuals, objects, or events is selected and analyzed in order to find out something about the entire population from which it was selected. Hence, sampling helps to reduce expenditure, save time and energy, permit measurement of greater scope, or produce greater precision and accuracy. Sampling procedures provide generalizations on the basis of a relatively small proportion of the population. The representative proportion of the population is called a sample (Koul 2007, p. 111).

The sample in the current investigation was drawn at two levels:

- The school sample
- The student sample

The school sample

In the present study random sampling technique was used to select the schools for intervention. A list of Government Schools under the administration of Chandigarh was procured from District Education Office, Chandigarh. Of this list, six schools were randomly selected using the lottery method. Investigator personally visited all these six schools to assess them on matching criteria and to get permission from the authorities. Since the researcher had a written permission from the District education officer, so none of these schools denied for the research experiment. In order to ensure the unbiasedness and proper matching for the final selection of the schools, investigator had compared all of these six schools. After comparing the schools with regards to the criteria, investigator had shortlisted three schools with respect to the background of the students, type of the school (government schools), class environment, school size, sex composition (co-educational), cooperation from the school authorities and infrastructure of the school. The list of the three schools taken for the study is given below:

- Government high school sector 25, Chandigarh
- Government high school, sector 53, Chandigarh
- Government high school, sector 52, Chandigarh

The student sample

The current research was carried out on IX grade students, of the age ranging between 14-16 years. The initial student sample comprised of 350 students chosen from three schools of Chandigarh. An adapted test on Locus of control was administered to all 350 adolescents of these three schools. In accordance with the norms of the scale, the adolescents were divided
into three groups- adolescents having internal Locus of control, the average scorers and adolescents having external Locus of control. After scoring, it was found that in chosen sample, 82 adolescents exhibited internal Locus of control, 166 adolescents scored average scores (average scorers may see themselves as partially in control of their lives. Perhaps they see themselves as in control at work, but not in their social lives or vice versa (Nowicki and Strickland, 1973) and 102 adolescents were found to exhibit external Locus of control. Furthermore, of the initial sample of 350, 160 students were randomly drawn to be a part of experimental and control groups of which 40 in each group had internal Locus of control and 40 were randomly chosen for external Locus of control for both the experimental and control groups. Since the whole study lasts for 56 working days, so there was a probability that some of the participants might drop during or at the end (post testing phase). So to remain in the safe side researcher collected more than the required sample in both the groups and while doing the analysis such dropouts were dropped from the data.

The schools taken for the study and the total initial sample taken from each school has been presented in table 3.1 and the structure of group allocation i.e. experimental and control group has been shown in the figure 3.4.

Figure 3.4: Schematic layout of the final sample of the study
Table 3.1: Initial Sample distribution

<table>
<thead>
<tr>
<th>S.no</th>
<th>Name of the school</th>
<th>Internal LOC</th>
<th>Average scorers</th>
<th>External LOC</th>
<th>Total no. of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Government high school sector 25, Chandigarh</td>
<td>22</td>
<td>61</td>
<td>40</td>
<td>123</td>
</tr>
<tr>
<td>2.</td>
<td>Government high school, sector 53, Chandigarh</td>
<td>45</td>
<td>55</td>
<td>44</td>
<td>144</td>
</tr>
<tr>
<td>3.</td>
<td>Government high school, sector 52, Chandigarh</td>
<td>15</td>
<td>50</td>
<td>18</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>82</td>
<td>166</td>
<td>102</td>
<td>350</td>
</tr>
</tbody>
</table>

Out of this initial sample of 350 students, the final sample selected was 160. This final sample of 160 students was divided into two groups i.e., experimental and control groups where both the groups had equal number of students with internal and external Locus of control. The details of this distribution have been tabulated below in table 3.2:

Table 3.2: Final distribution of the selected sample

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the group</th>
<th>Students with Internal LOC</th>
<th>Students with External LOC</th>
<th>Total number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Experimental group</td>
<td>40</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>2.</td>
<td>Control group</td>
<td>40</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>80</td>
<td>80</td>
<td>160</td>
</tr>
</tbody>
</table>

Though the sample is small for the result of the study to be generalized but availability of a large sample and feasibility of carrying out such an experimental study on a large sample was beyond the control of the investigator. Several such types of experimental studies conducted earlier have also used small samples. Burke (2010) investigated on Pre- and early adolescent students of the 4th to 7th grades by taking total sample of 246 adolescents drawn from six mindfulness program classrooms and six comparison classrooms. Mohan, Sharma and Bijlani (2011) conducted a study on 32 healthy adult male student volunteers who had never practiced meditation before the study. Kang, Jung, Kim, Jung, Choi and Kwon (2012) had taken 46 experienced meditators and 42 freshers making a total sample of 99 students. Quach,
Mano and Alexander (2016) recruited 198 adolescents from a large public middle school in southwest United States and randomly assigned to mindfulness meditation, hatha yoga, or a waitlist control condition.

3.4. Tools used

Tools and research instruments are an integral part of carrying a research. The selection of the tools for collecting the data primarily depends upon the type of the research and objectives to be achieved. In the current investigation, the following tools were used:

1. Intentional intelligence intervention modules were developed by the investigator herself.
2. Intentional intelligence scale for adolescents (developed and standardized by the Investigator)
3. Multiple Anxiety scale for adolescents (developed by the Investigator)
4. Self esteem scale for adolescents (developed by the Investigator)
5. Academic achievement was analyzed through the marks obtained by the students in their previous examination- Summative assessment I (These marks were used as the pre test data for academic achievement); Investigator also recorded the marks obtained by the students in their final examination (Summative assessment II). These marks were used as the post test data for academic achievement.
6. Locus of control scale by Nowicki and Strickland, 1973 (adapted by the Investigator)

3.5. Procedure followed for the study

The present experimental investigation was conducted in two main stages: Selecting the sample for the experiment and conducting the experiment.

Stage I: Selecting the sample

The process of sample selection has already been discussed under the heading sample in the earlier section.

Stage II: Conducting the experiment

The present study was conducted on IX class students studying in three schools of Chandigarh viz. Government high school, sector 25, Chandigarh, Government high school, sector 53, Chandigarh and Government high school, Sector 52, Chandigarh. The investigator discussed the proposed intervention programme with the principals and coordinators of these
schools. A meeting with class teachers helped to chalk out the date and time schedules for the implementation of the experiment. After this the researcher established a rapport with ninth graders of these schools. An adapted Locus of control scale was administered on the total sample of 350 ninth graders studying in these schools. On the basis of scores obtained by them they were categorized into two groups viz. internal Locus of control and external Locus of control. These students were further allocated randomly into experimental and control groups in such a manner that both the groups comprised of 40 adolescents with internal and 40 with external Locus of control. Hence, the final sample comprised of 160 students divided in to two subgroups viz. 40 adolescents with internal Locus of control and 40 adolescents with external Locus of control in both experimental and control groups. Once the groups containing required number of participants were formed, the experiment was conducted in four phases viz. pre testing, administering intervention program, post testing, scoring, tabulation and analysis of data.

The experiment was conducted in four phases as described below:

Phase-I: Pre-Testing:

In the pre testing phase, self developed tests to measure Intentional intelligence, Anxiety, Self esteem were administered on both experimental and control groups. Academic achievement was measured through the marks obtained by the students in their previous examination (Summative assessment 1). These marks were used as the pre test data for Academic achievement. Pre testing lasted for approximately two working days.

Phase-II: Administering intervention program

In the second phase of this stage, 56 days Intentional intelligence intervention was given to the experimental group where daily sessions based on yogic, mindfulness and meditation activities were practiced for 45 minutes duration. During this period of intervention, the investigator had taken care that the control group was given no intervention and was totally debarred from any kind of intervention.

Phase-III: Post-Testing

In this phase, same tests (the ones used in pre testing) on Intentional intelligence, Anxiety and Self esteem were again administered on both experimental and control groups. The same tests were administered again to explore whether or not any gain has occurred in the score of dependent variables. Post testing also lasted for two working days. Investigator also recorded the marks obtained by the students in their final examination (Summative assessment II).
These marks were used as the post test data for Academic achievement.

Phase-IV: Scoring, tabulation and analysis of data

All the answer sheets were scored according to their prescribed scoring keys and data thus obtained, was subjected to statistical analysis. The following figure 3.5 represents the scheme of the events diagrammatically.

**Figure 3.5: Showing the detailed scheme of the present investigation**

3.6. Statistical techniques used

The following statistical techniques were employed to analyse the obtained data in order to test the hypotheses.

v. Descriptive statistics such as mean, median, standard deviation, skewness and kurtosis were worked out to ascertain the nature of distribution of scores.
vi. Graphical representations were used to understand the data through visual presentations.

vii. t-test was employed to find out significant difference, if any, exists in the mean scores of experimental and control and internal and external Locus of control groups on the dependent variable viz. Intentional intelligence, Anxiety, Self esteem and Academic achievement.

viii. 2X2 Factorial ANOVA was employed to study the impact of the intervention on selected dependent variables of the study. It was used to study the main as well as interaction effects. SPSS-16 software was applied on the data in order to analyze the descriptive and inferential statistics.

3.7. Precautions Observed

While conducting the present experimental research, certain precautions were taken so as to ensure the real and unbiased results. These were:

- The researcher developed and maintained good rapport with the school authorities, teachers as well as with the students.
- Prior to the intervention, teachers and the principal were told about the positive impact of the intervention programme.
- Conducive and harmonious atmosphere was ensured for the students during the program.
- Researcher made sure that all the selected students participate in the experiment and also that everyone gets benefitted from it.
- Orientation sessions were carried out with the students before actually carrying out the programme to establish rapport with them.
- Allotted period of 45 minutes duration was completely utilized for the treatment.
- The categorisation of students according to the variables and treatment was not discussed with the subjects in order to ensure unbiased results.
- Before experimentation it was made sure that students had no such exposure to this type of intervention before.
- The experiment was conducted strictly according to the design of the research work and it was also made sure that instructions did not deviate much from the steps planned.