CHAPTER III

RESEARCH DESIGN
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Research may be defined as the application of scientific method in the study of problems. Research is a systematic attempt to obtain answers to meaningful questions about phenomena or events, through the application of scientific procedures.

Research in education is essential for providing useful and dependable knowledge, through which the system of education can be made more effective.

Types of Educational Research: Best and Kahn (1996) describe the types of educational research as follows:

1. Historical research: Historical research describes what was. The process involves investigating, recording, analysing, and interpreting the events of the past, for the purpose of discovering generalisations that are helpful in understanding the past and the present, and to a limited extent, anticipating the future.

2. Descriptive research: Descriptive research is sometimes known as non-experimental or correlational research. It deals with relationships between variables, and testing of hypotheses or theories that have universal validity. A descriptive study describes what is. It is concerned with existing relationships and conditions, opinions held, ongoing processes, evident effects, and developing trends.

3. Experimental research: Experimental research describes what will be, when certain variables are carefully controlled or manipulated. The focus is on variable relationships. A deliberate manipulation is always a part of the experimental research.

METHODOLOGY FOR THE PRESENT RESEARCH

The present research includes a study of institutional environment, institutional systems, and effectiveness of architectural education, as these exist at present, and as
perceived by students, teachers, and principals of colleges of architecture. Hence, the
descriptive method of research is the most suitable method for the present research.
The research concentrates on institutional outputs in terms of the discrepancy between
the expected and actual performances of functions of architectural education, and
college results.

The present research adopts the descriptive methods of the survey, correlational
and prediction studies, and causal-comparative studies. These different types are
discussed here in detail.

Survey:

It is the most commonly used descriptive method in educational research. The
survey method gathers data from relatively large number of cases at a particular time.
According to Koul (1984), survey studies are conducted to collect detailed description
of existing phenomenon, with the intent of employing data to justify current conditions
and practices, or to make more intelligent plans for improving them. The objectives of
survey studies are not only to analyse, interpret, and report the status of an institution,
group, or area; but also to determine the adequacy of status by comparing it with
established standards.

Similarly, according to Cohen and Manion, "surveys gather data at a particular
point in time with the intention of a) describing the nature of existing conditions, or b)
identifying standards against which the existing conditions can be compared, or c)
determining the relationships that exist between specific events."^3

According to Best and Kahn "A survey is not concerned with characteristics of
individuals as individuals. It is concerned with the generalised statistics that result
when data are abstracted from a number of individual cases."^4
Intentions of a survey are as follows:

a) To describe the nature of the existing conditions.
b) To identify standards, against which existing conditions can be compared.
c) To compare the existing status with the established status and standards.
d) To determine the relationships that exist between the events.
e) To suggest means of improving the existing conditions.

The survey method in the present study has been used to collect and analyse data pertaining to institutional systems and college results from the various colleges of architecture. It includes data in terms of infrastructure, personnel, aims and objectives of education, and input, process, output of institutional systems. It is also used to obtain suggestions of improvement from students, teachers, and principals of colleges of architecture, and from practising architects. Data regarding college results are collected for university examinations held during 1997, 1998, and 1999.

**Correlational and Prediction Studies:**

Correlational studies are frequently used in descriptive research. They are concerned with determining the extent of relationship existing between variables. They are used to obtain description of existing phenomena, and to enable the researcher to ascertain the extent to which variations in one variable are associated with variations in another. Correlational research embraces those studies, which attempt to discover or clarify relationships by using correlation coefficients. Relationships thus disclosed may indicate what is associated with what in a given context, or else they may provide a basis on which to make predictions about the variable being studied. This type of research is mainly concerned with achieving a fuller understanding of the complexity
of phenomena. The magnitude of relationship is determined using coefficient of correlation.

Interpretation of a coefficient of correlation is done by the following:

a. By considering the degree of magnitude of relationship.
b. By considering the direction of relationship.
c. By considering the statistical significance of the magnitude of relationship.

The descriptive method of the correlational type is used in the present study to ascertain the following relationships:

a) The relationship of the actual performance of functions of architectural education with total institutional environment and its dimensions, namely, administration, admission procedure, course content, evaluation, infrastructure, student characteristics, student development, and teacher characteristics, as perceived by the total sample of students, as well as by the total sample of teachers.
b) The relationship of discrepancy scores with total institutional environment and its dimensions, namely, administration, admission procedure, course content, evaluation, infrastructure, student characteristics, student development, teacher characteristics, as perceived by the total sample of students, as well as by the total sample of teachers.
c) The relationship between the actual and expected performances of functions of architectural education, as perceived by the total sample of students, as well as by the total sample of teachers.
d) The relationship between the actual and expected performances of functions of architectural education, as perceived by students from different colleges.
e) The relationship of college results with the actual performance of functions of architectural education as perceived by the students from different colleges.

f) The relationship of college results with the discrepancy scores of the students from different colleges.

g) The relationship of college results with total institutional environment and its dimensions, namely, administration, admission procedure, course content, evaluation, infrastructure, student characteristics, student development, and teacher characteristics, as perceived by students from different colleges.

**Causal-Comparative Studies:**

Causal-comparative studies attempt to determine the influence of a trait or behaviour on some performance, by comparing subjects who manifest the trait or display the behaviour, with comparable subjects who manifest or display it to a lesser extent, or do not display it at all.

In causal-comparative studies, the group that shows evidence of the trait or behaviour under study is known as defined group. The group of individuals which shows evidence of the trait or behaviour to a lesser extent, or not at all, is known as the comparison group. As described by Koul (1984) the causal-comparative studies are based upon Mill’s (1946) method of discovering causal relationships. Mill’s method of agreement states that, “If two or more instances of the phenomenon under investigation have only one circumstance is common, the circumstance in which alone the instances agree is the cause or effect of the given phenomenon.”

This method is also known as ex post facto research in which the independent variables have already occurred, and in which the researcher starts with the observation of a dependent variable. The researcher then studies the independent variable in
retrospect for their possible relationship to, and effects on, the dependent variable. The researcher is thus examining retrospectively the effects of a naturally occurring event on a subsequent outcome, with a view to establishing a causal link between them.

In the present research, the descriptive method of the causal-comparative type is used to ascertain the differences in the students' and teachers' perceptions of the institutional environment, and their perceptions of the performance of functions of architectural education as follows:

a) Gender differences.
b) College-wise differences.
c) Student-teacher differences.

The method is used to ascertain the differences in the perceptions of male and female students, and of male and female teachers. It is used to ascertain the differences in the perceptions of students and teachers from different colleges. It is also used to ascertain the differences between the perceptions of the total sample of students, and the total sample of teachers. The differences in their perceptions of the following variables are considered for the present research:

i) Total institutional environment and its dimensions namely, administration, admission procedure, course content, evaluation, infrastructure, student characteristics, student development, and teacher characteristics.

ii) Expected performance of functions of architectural education.

iii) Actual performance of function of architectural education.

iv) Discrepancy between the actual and expected performances of functions of architectural education.
VARIABLES OF THE PRESENT RESEARCH

The present research focuses its attention on the following variables:

A) The total institutional environment and its following dimensions, as perceived by students, teachers, and principals of colleges of architecture:

1. Administration.
2. Admission Procedure.
3. Course Content.
4. Evaluation.
5. Infrastructure.
6. Student Characteristics.
7. Student Development.
8. Teacher Characteristics.

B) Opinions of students, teachers, and principals regarding the institutional systems.

C) Expected performance of functions of architectural education, as perceived by the students, teachers, and principals of different colleges.

D) Actual performance of functions of architectural education, as perceived by the students, teachers, and principals of different colleges.

E) College results.

SAMPLE

The study of any educational phenomenon requires data to be collected from some units, which may be students, teachers, principals, parents, as well as non-living beings, such as textbooks, documents, pictures, and relics. These animate or inanimate units form the population of a research. A population is any group of individuals that
have one or more characteristics in common that are of interest to the researcher. It is known as the population of the research. It is impracticable, if not impossible, to test, interview, or observe each unit of population under controlled conditions, in order to arrive at principles or generalisations having universal validity. Normally, a small number of individuals, objects, or events are selected as a sample for such a study.

The population of the present research includes all the nine colleges of architecture offering B.Arch. degree, which are affiliated to University of Mumbai. It further consists of teachers and principals of these colleges, students of semester VIII, as well as all the practising architects graduated from University of Mumbai and residing in Mumbai.

A sample is a small representative proportion of units selected from a large population for observation and analysis. By observing the characteristics of the sample, certain inferences can be made about the characteristics of the entire population from which it is drawn. After defining a population and listing all the units, a researcher selects a sample of units. The process of such a selection is called sampling. There are various methods for selecting samples. According to Kouf (1984) these methods can be classified into two broad categories:

1. Non-probability sampling: This category includes the following methods:
   a. Convenience sampling
   b. Quota sampling
   c. Purposive sampling

2. Probability sampling: This category includes the following methods:
   a. Simple random sampling
   b. Quasi-random or systematic sampling
c. Stratified random sampling  
d. Area or cluster sampling  

**Sample of the present research:**

The present study includes a sample of all the students of fourth year architecture (semester eight), selected from eight colleges of architecture affiliated to University of Mumbai. It does not include Academy of Architecture (a government-aided private college), which was affiliated to University of Mumbai in 1999, and so far no students of this college have appeared for university examinations.

The present study required data to be collected from students of fourth year of B. Arch course. For this purpose, the tools were initially given to 350 students. However, out of these, only 301 students responded with complete information. Data from the remaining 49 students had to be discarded because of incompleteness. This led to a wastage rate of 14%.

The present research also collected data from teachers, principals, and practising architects. The sample size of each of these categories is shown in table 3.1.

**TABLE 3.1**  
**SAMPLE SIZE.**

<table>
<thead>
<tr>
<th>Type of Respondents</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td>301</td>
</tr>
<tr>
<td>Teachers</td>
<td>62</td>
</tr>
<tr>
<td>Principals</td>
<td>7</td>
</tr>
<tr>
<td>Practising Architects</td>
<td>20</td>
</tr>
</tbody>
</table>

The sample is further described in detail in the following tables.
A) Sample of colleges of architecture:

The following table 3.2 shows the distribution of colleges of architecture on the basis of location of colleges.

**TABLE 3.2**

**SAMPLE OF COLLEGES: LOCATIONWISE.**

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of Colleges</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mumbai City</td>
<td>1</td>
<td>12.5%</td>
</tr>
<tr>
<td>Mumbai Suburbs</td>
<td>4</td>
<td>50.0%</td>
</tr>
<tr>
<td>New Mumbai</td>
<td>2</td>
<td>25.0%</td>
</tr>
<tr>
<td>Raigad</td>
<td>1</td>
<td>12.5%</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>---</td>
</tr>
</tbody>
</table>

The following table 3.3 shows the distribution of colleges on the basis of type of management of the college.

**TABLE 3.3**

**SAMPLE OF COLLEGES ON THE BASIS OF TYPE OF MANAGEMENT.**

<table>
<thead>
<tr>
<th>Type of Management</th>
<th>Number of Colleges</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government college</td>
<td>1</td>
<td>12.5%</td>
</tr>
<tr>
<td>Unaided private college</td>
<td>7</td>
<td>87.5%</td>
</tr>
<tr>
<td>Government-aided private college</td>
<td>0</td>
<td>---</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>---</td>
</tr>
</tbody>
</table>
The following is the list of colleges included in the study:

3. I.E.S. College of Architecture, Bandra, Mumbai.
5. Late Bhausaheb Hiray College of Architecture, Bandra, Mumbai.
7. Rizvi College of Architecture, Bandra, Mumbai.

B) Sample of students and teachers:

The following table 3.4 shows the distribution of total sample of students and teachers on the basis of gender.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Sample</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Students</td>
<td>Teachers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number</td>
<td>Percentage</td>
<td>Number</td>
</tr>
<tr>
<td>Male</td>
<td>136</td>
<td>45.18%</td>
<td>34</td>
</tr>
<tr>
<td>Female</td>
<td>165</td>
<td>54.82%</td>
<td>28</td>
</tr>
<tr>
<td>Total</td>
<td>301</td>
<td>---</td>
<td>62</td>
</tr>
</tbody>
</table>

The following table 3.5 shows the distribution of total sample of students and teachers on the basis of colleges of architecture.
### TABLE 3.5
SAMPLE OF STUDENTS AND TEACHERS BASED ON COLLEGES

<table>
<thead>
<tr>
<th>College</th>
<th>Students</th>
<th>Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percentage</td>
</tr>
<tr>
<td>1</td>
<td>32</td>
<td>10.63%</td>
</tr>
<tr>
<td>2</td>
<td>34</td>
<td>11.30%</td>
</tr>
<tr>
<td>3</td>
<td>37</td>
<td>12.29%</td>
</tr>
<tr>
<td>4</td>
<td>34</td>
<td>11.30%</td>
</tr>
<tr>
<td>5</td>
<td>37</td>
<td>12.29%</td>
</tr>
<tr>
<td>6</td>
<td>37</td>
<td>12.29%</td>
</tr>
<tr>
<td>7</td>
<td>29</td>
<td>9.63%</td>
</tr>
<tr>
<td>8</td>
<td>61</td>
<td>20.27%</td>
</tr>
<tr>
<td>Total</td>
<td>301</td>
<td>---</td>
</tr>
</tbody>
</table>

C) Sample of practising architects.

The following table 3.6 shows the distribution of practising architects on the basis of years of professional experience.

### TABLE 3.6
SAMPLE OF PRACTISING ARCHITECTS ON THE BASIS OF YEARS OF PROFESSIONAL EXPERIENCE

<table>
<thead>
<tr>
<th>Years of Practice</th>
<th>Number of architects</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 5 years</td>
<td>5</td>
<td>25.00%</td>
</tr>
<tr>
<td>5 to 10 years</td>
<td>5</td>
<td>25.00%</td>
</tr>
<tr>
<td>10 to 20 years</td>
<td>5</td>
<td>25.00%</td>
</tr>
<tr>
<td>More than 20 years</td>
<td>5</td>
<td>25.00%</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>---</td>
</tr>
</tbody>
</table>
DATA FOR THE PRESENT RESEARCH

The researcher has used the perceptual approach to the study of institutional environment. Besides, the researcher has also used the systems approach and the goal attainment approach for appraisal of architectural education. The researcher has aimed at studying the strengths and weaknesses of the B.Arch. course, and obtaining suggestions for improvement from students, teachers, principals, and practising architects. The research data thus comprise of the following:

A) Data regarding institutional environment which include students’, teachers’, and principals’ perceptions of the total institutional environment and its following dimensions:

1. Administration
2. Admission Procedure
3. Course Content
4. Evaluation
5. Infrastructure
6. Student Characteristics
7. Student Development.
8. Teacher Characteristics

B) Data regarding institutional systems:

1. Opinions of students, teachers, and principals regarding institutional system.
3. Opinions of principals regarding the performance of the institution.
4. General description of the institution.
5. Strengths and weaknesses of the course.
C) Data regarding institutional outputs.

1 Students’ and teachers’ perceptions of the expected and actual performances of functions of architectural education, so as to measure the institutional output in terms of the discrepancy between the actual and expected performances of functions of architectural education.

2 College results of university examinations for three years (April 1997 to April 1999)

D) Suggestions for improvement given by students, teachers, and practising architects.

**RESEARCH TOOLS**

Research tools are means of collecting new data. A researcher requires many data-gathering tools or techniques, which may vary in their complexity, design, administration, and interpretation. The tools employ unique ways of describing and quantifying the data. The choice of tools depends upon the nature and purpose of the research. The major data gathering tools for descriptive research may be classified into following categories.

- Achievement and aptitude tests
- Questionnaire
- Opinionnaire
- Checklist
- Rating scale
- Inventories
- Projective Devices
- Interview Schedules
- Observation Schedules
Each tool is appropriate for the collection of certain type of evidence or information. The researcher can select from the available tools, which will provide the required data for testing hypotheses for the research. In some situations the existing tools do not suit the purpose, so the researcher may modify the tools or construct his own tools. Before using the tools for collecting data for the research situations, the researcher must ascertain their validity and reliability.

**Validity of a Research Tool**

Validity refers to the extent to which a tool measures what it claims to measure. A data collection tool must produce information that is not only relevant, but also free from systematic error; that is, it must produce valid information. The types of validity are as follows.

a) Face validity
b) Content validity.
c) Criterion validity
d) Concurrent validity
e) Construct validity

According to Brown, "a test has face validity when the items look like they measure what the test is supposed to measure." The adequacy of face validity of a test could be determined by a) the subjects who take it, b) the administrators who adopt it, or c) an expert who might judge it.

On the other hand, "content validation involves a determination of the adequacy of the sampling of items from the universe of potential items, and content validity is a 'measure' of the adequacy of sampling."
In the present study, both face validity and content validity have been determined for the tools developed by the researcher.

The present research aims at a study of the institutional environment and institutional systems, as described by the students, teachers, and principals. It was necessary to check whether the tools were adequate to cover all the aspects of the dimensions of institutional environment and institutional systems. It was also necessary to confirm that the statements were relevant as per the definition of the concepts being measured, and properly worded so that valid information can be obtained. Hence, the researcher established the face validity and content validity of the tools by asking opinions of experts in the field of education and architecture.

**Reliability of a tool:**

Reliability refers to the consistency with which a tool produces equivalent scores. Such equivalence is determined in relation to repeated administrations, as well as administrations to a variety of subjects.

There are three procedures in common for assessing the reliability of a tool. They include the following:

1. The Internal Consistency Reliability
2. The Test-retest Reliability.
3. The alternate or parallel forms method.

In the present research, the researcher has established the internal consistency reliability of the tools (using the split-half method and Cronbach's alpha method), as well as the test-retest reliability.
TOOLS USED FOR THE PRESENT RESEARCH

The present research uses both readymade as well as researcher made tools for collecting data. These tools are as follows:

A) Tools prepared by the researcher:

1. Institutional Environment Perception Scale for students.
4. Institutional Description Inventory.
5. Personal Data Sheets for students, teachers, and practising architects.

B) Ready-made tools:

1) Perceived Effectiveness of Education Scale (Wakpainjan, 1998).
2) Self-Appraisal Questionnaire for principals (D'Souza and Prabhakar, 1987).

These tools are described here in detail.

1. Institutional Environment Perception Scale for students:

The researcher has reviewed the studies related to college environment. These studies are described in detail in Chapter II. The present research concentrates on academic environment, and the researcher has used the perceptual approach to the study of institutional environment.

On reviewing the empirical literature on institutional environment, the researcher has identified the following major tools used in prior researches at the college level.

a) College and University Environment Scale (CUES) by Pace\textsuperscript{10} (1969), which includes dimensions such as pragmatism, status, community awareness, and propriety.
b) Part II of College-Student Questionnaire (CSQ) by Peterson\textsuperscript{11} (1968), which was prepared to measure students' satisfaction with faculty, administration, students, study habits, and extra-curricular activities.

c) Institutional Functioning Inventory (IFI) by Peterson et al\textsuperscript{12} (1970), which includes dimensions such as intellectual-aesthetic curriculum, freedom, human diversities, concern for improvement of society, concern for undergraduate learning, democratic governance, meeting local needs, self study and planning, concern for innovation, and intellectual esprit.

In the present study, the researcher has selected those dimensions of institutional environment, which are experienced by students and teachers. These dimensions pertain to both tangible and non-tangible areas of institutional environment. The researcher has identified the following dimensions of institutional environment:

1. Administration
2. Admission Procedure
3. Course Content
4. Evaluation
5. Infrastructure
6. Student Characteristics
7. Student Development.
8. Teacher Characteristics

The researcher is working as a Reader in architecture in one of the colleges of architecture in Mumbai, and has a teaching experience of thirteen years. Based upon the study of related literature, her own teaching experiences, discussions with her
colleagues, and discussions with her research guide, the researcher prepared a number
of statements concerning the various dimensions of institutional environment. Initially,
a pool of items was prepared with the following number of statements for each
dimension.

1. Administration 13
2. Admission Procedure 10
3. Course Content 12
4. Evaluation 10
5. Infrastructure 19
6. Student Characteristics 18
7. Student Development 12
8. Teacher Characteristics 13

**Pattern of the scale:**

The following two options of determining the pattern of the tool were possible:

a) To administer all the dimensions separately.

b) To randomise the items and administer as one scale.

The first option was easy for scoring and tabulation, but there was a danger of
getting unreliable responses because of the possibility of the responders predicting
what the researcher intends to measure. This can result in errors due to the halo effect.
In the second option, the items are arranged in a random manner, so that no clear
pattern is seen. Schriesheim, Kopelman, and Soloman\(^{13}\) (1989) have studied the effect
of grouped versus randomised questionnaire formats on scale reliability and validity.
They found that the reliability and validity of the tools were more when the tools were
administered in the randomised format.
It was decided that for the present study, the scale was to be administered in the random format for the pre-pilot study, the pilot study, as well as the actual data collection.

**Face Validity and Content Validity of the Tool:** Face validity and content validity of the tool were established by giving the tool to seven experts for their opinion and criticism. The list of the experts is given in Appendix I. The experts were requested to give their opinions regarding the appearance of the tool to establish the face validity of the tool. The experts were requested to give their comments regarding the relevance of each statement with respect to the purpose of the study, so as to establish the content validity of the tool. Students' responses on this tool were obtained in a pre-pilot study, and an item analysis was conducted on students' responses to the tool.

**The Pre-pilot Study:**

The tool was administered to 50 students from semester eight and semester nine, enrolled in the year 1998, out of whom 35 students responded with complete information. The responses were scored for each positively worded statement as follows:

<table>
<thead>
<tr>
<th>Response category</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree (SDA)</td>
<td>1</td>
</tr>
<tr>
<td>Disagree (DA)</td>
<td>2</td>
</tr>
<tr>
<td>Agree (A)</td>
<td>3</td>
</tr>
<tr>
<td>Strongly Agree (SA)</td>
<td>4</td>
</tr>
</tbody>
</table>

For negatively worded statements, the items were scored in the opposite order.

The total scores were computed for each respondent. These scores were then arranged from the highest to the lowest. From the arranged scores, the top 27% i.e. 10
scores, and the bottom 27% i.e. 10 scores were separated. Thus upper 10 and lower 10 scores were considered for item analysis.

The discrimination power or validity index of each item was calculated using the following formula.

$$D.I. = \frac{N_H - N_L}{0.27 N}$$

where $N_H$ = Number of correct responses in the group with high scores,

$N_L$ = Number of correct responses in the group with low scores,

$N$ = Sample size.

The criterion used for selection of items for the final draft was as described by Garret\textsuperscript{14}. The items with validity indices of 0.20 or more were considered satisfactory, and were retained in the final draft of the tool. The numbers of items retained in each dimension after the pre-pilot study are as follows:

a) Administration 12
b) Admission Procedure 7
c) Course Content 10
d) Evaluation 10
e) Infrastructure 20
f) Student Characteristics 11
g) Student Development 12
h) Teacher Characteristics 13

Total items 95

These 95 items were incorporated in the final draft of the tool. Thereafter, a pilot study was conducted for assessing the reliability of the tool. The tool was
administered to 65 students, out of whom 53 students responded with complete information.

Reliability of the Tool:

The researcher used the following methods for assessing the reliability of the tool:

1) Internal Consistency Reliability: This is computed using two methods:

a) The split-half method.

b) Cronbach's alpha.

Both of these are described in the following sections:

a) The Split-half Method: This method, as the name suggests, consists of breaking the original test into two equivalent halves and computing the coefficient of correlation between the scores on the two halves. The coefficient of correlation in this manner gives the reliability of only the half scale. The self-correlation of the whole scale is then calculated by using the Spearman-Brown prophecy formula\(^{15}\), which is as follows:

\[
 r_{11} = \frac{2 r_{\frac{1}{2} \frac{1}{2}}}{1 + r_{\frac{1}{2} \frac{1}{2}}}
\]

where \( r_{11} = \) reliability coefficient of the whole scale,

\( r_{\frac{1}{2} \frac{1}{2}} = \) reliability coefficient of the half scale

However, this correction formula can only be used when the numbers of items in the halves are equal.

Horst's formula\(^{16}\). This formula gives a coefficient of correlation between the two halves, even when the halves are not equal. The numerical value of 'r' using this
formula is equivalent to one obtained using Spearman-Brown prophecy correction formula.

Horst’s formula is as follows:

\[
\hat{r}_{1/2} = \frac{r_{1/2} \left( \sqrt{\hat{r}_{1/2}^2 + 4pq\left[1 - \left(\frac{r_{1/2}}{2}\right)^2\right]} - \hat{r}_{1/2} \right)}{2pq\left[1 - \left(\frac{r_{1/2}}{2}\right)^2\right]}
\]

where \( \hat{r}_{11} = \) coefficient of self correlation of the whole scale,

\( r_{1/2} = \) coefficient of self correlation between two parts,

\( p = \) proportion of the total scale in the first part,

\( q = \) proportion of the total scale in the second part

Reliability of the tool for the present research is calculated as follows:

The test was divided into two unequal halves; 48 items in the first half and 47 items in the second half. The coefficient of correlation was calculated by using Pearson’s product moment coefficient of correlation with the following formula:

\[
\hat{r}_{1/2} = \frac{N \sum XY - (\Sigma X)(\Sigma Y)}{\sqrt{\{N \sum X^2 - (\Sigma X)^2\}\{N \sum Y^2 - (\Sigma Y)^2\}}}
\]

The obtained value of \( \hat{r}_{1/2} = 0.789 \)

As the two halves are not equal, Horst’s formula was applied. The reliability coefficient after application of the correction formula was found to be.

\( \hat{r}_{11} = 0.882 \)
b) **Cronbach's Alpha**: The formula in this case is as follows.

\[ \alpha = \frac{n}{n-1} \left\{ 1 - \frac{\sum \sigma_i^2}{\sigma_t^2} \right\} \]

where \( \sum \sigma_i^2 \) = sum of variance of the scores on each item,

\( \sigma_t^2 \) = variance of the total scores,

\( n \) = Number of items.

This formula gives an index of internal consistency that results in the average correlations of all possible split-half correlations.

Cronbach's Alpha for the IEPS was found to be \( \alpha = 0.8913 \).

**II) The Test- Retest Method:**

In this method, the same tool is re-administered at a later date to the same respondents. This method is used to check the consistency in the scores in the repeated administration.

For the present research, 53 students initially responded the IEPS. After four weeks, it was re-administered to the same group of respondents. Out of 53 students, 47 students responded to the retest with complete information. Scores for only those students who responded with complete information to both the test and the retest were considered for calculating the reliability coefficient by the test- retest method. Two sets of scores of these 47 students were prepared for their total scores on IEPS, for the test and the re-test. The two sets of scores were correlated to obtain the reliability coefficient as follows:
where \( X = \text{Total Institutional Environment Scores on first administration}, \)

\( Y = \text{Total Institutional Environment Scores on second administration}, \)

\( N = \text{Number of respondents for the test and the retest.} \)

The test-retest reliability coefficient for the IEPS was found to be:

\[
\hat{r} = 0.9157
\]

The following table 3.6 shows the reliability coefficients of IEPS for the students.

**TABLE 3.7**

<table>
<thead>
<tr>
<th>Type of Reliability</th>
<th>Method</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Consistency</td>
<td>Split half method</td>
<td>0.882</td>
</tr>
<tr>
<td>Internal Consistency</td>
<td>Cronbach's Alpha</td>
<td>0.89</td>
</tr>
<tr>
<td>Test-Retest Reliability</td>
<td>--</td>
<td>0.92</td>
</tr>
</tbody>
</table>

It can be seen from table 3.7 that the internal consistency reliability coefficients using both split half method as well as Cronbach's alpha are more than 0.80. Similarly, the coefficient of test-retest reliability is also high. Hence, it may be concluded that the IEPS for students is highly internally consistent and stable over time.

The minimum possible score on IEPS for students is 95, whereas the maximum possible score on it is 380.

The IEPS for students is given in Appendix II.

The following are the examples of items included in the IEPS for students.
All the notices for students are put up well in advance in this college.

It is very difficult to interpret the rules and regulations for admission for this course.

The course prepares the students to practice in urban as well as rural areas.

The semester pattern of examination properly divides the work into two halves.

The Architectural education only develops skills for drawing/drafting/colouring.

### 2) Institutional Environment Perception Scale for teachers

The IEPS for students includes the statements regarding those aspects of dimensions of institutional environment which are experienced by both students and teachers, and for which perceptions of students and teachers can be compared. Hence, it was decided that the IEPS for teachers would include all the statements from the scale meant for students. The researcher is currently working as a teacher in the same college where she has studied architecture. Hence, it was realized that certain aspects of administration dimension of institutional environment are unknown to the students, and they could be experienced or perceived only by the teachers. It was decided to prepare a separate tool for teachers to include the additional statements related to administration.

Content validity and face validity of IEPS for teachers was established by submitting it to the panel of seven experts mentioned in Appendix I. A dry run was conducted for 30 teachers using this tool. Discrimination index of each statement was calculated. The statements with DI equal to 0.20 or more than 0.20 were retained. The reliability coefficient using the split half method was computed for this tool, and was found to be 0.92. The tool consists of 104 statements, the minimum score on this scale is 104, and the maximum score is 416.
The numbers of statements for each dimension in the final draft of IEPS for teachers are as follows:

1) Administration 12
1-a) Administration (for teachers) 10
2) Admission procedure 7
3) Course content 10
4) Evaluation 10
5) Infrastructure 20
6) Student Characteristics 11
7) Student Development 12
8) Teacher Characteristics 12

Total 104

The following are the examples of additional items on administration (for teachers) included in the IEPS for teachers.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>SDA</th>
<th>DA</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>AT</td>
<td>Teachers are expected to do a lot of administrative work in this college.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>AT</td>
<td>Plans of activities are consistent in this college.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>AT</td>
<td>Teachers of this college are given freedom to prepare the teaching programmes.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The scores for additional statements i.e. administration (for teachers) dimension scores, ATDS are considered, and added to TIES while comparing scores of male and female teachers, and while comparing scores of teachers from different colleges. These scores are not considered when students’ and teachers’ scores are compared.

The IEPS for teachers is given in Appendix III.
3) **Institutional Systems Opinionnaire (ISO)**

The present research aims at studying institutional systems as experienced and expressed by students, teachers, and principals of colleges of architecture. It also includes a study of suggestions for improvements put forward by students, teachers, principals, and practising architects.

The opinionnaire was designed in three parts to obtain the responses as follows:

- **Part A)** Opinions regarding Input-Process-Output variables of institutional system.
- **Part B)** Opinions regarding strengths and weaknesses of the course.
- **Part C)** Suggestions for improvement in architectural education.

The opinionnaire was semi-structured, and it allowed the respondents to give additional information beyond the given structured optional answers.

**Part A)** Part A of the ISO included the following aspects:

1) **Input variables**

   a. Aims of the college
   b. Objectives of the curriculum
   c. Course content.
   d. Books in the library
   e. Student qualities such as intelligence, regularity, sincerity, creativity, and punctuality.

2) **Process Variables**

   a. Teaching-learning and guidance
   b. Administration
   c. Evaluation of sessional work
   d. Theory examinations
3) Output Variables
   a. Students performance in studios
   b. Timely completion and submission of sessional work

**Part B)** This part of the opinionnaire was designed to seek the opinions of students, teachers, principals, and practising architects regarding the strengths and the weaknesses of the course.

**Part C)** This part of the opinionnaire invites suggestions for improvement with reference to the following aspects of architectural education:

1. Admission Procedure
2. Fees structure
3. Time Frame of the course
4. Course Content
5. Sessional Work
6. Teaching-learning methods
7. Examination System
8. Methods of Evaluation
9. Administration
10. Co-curricular Activities
11. Infrastructural Facilities

The content validity of the tool was established by seeking opinions of the panel of seven experts in the field of education, mentioned in Appendix I. A dry run of ISO was conducted to ensure the clarity and feasibility of the tool.

This tool is given in Appendix IV.
4) **Institutional Description Inventory (IDS):**

This inventory was designed to collect information on the tangible, physical or infrastructural aspects and activities of a college, and incorporated items to collect data on the name of the college, its year of establishment, its type of management, its status, the nature of its building, the number of students admitted, the number of teachers employed, additional courses and co-curricular activities offered, and the availability of facilities. This tool is given in Appendix V.

5. **Personal Data Sheet for Students:**

This was designed to obtain background information concerning students, and includes data about their names and gender, along with the class in which they are studying, and the name of the college. This tool is given in appendix VI.

6. **Personal Data Sheet for Teachers:**

This was designed to obtain background information concerning teachers, and includes data about their names and gender, the class to which they teach, the type of teaching appointment, and the name of the college. This tool is given in appendix VI.

7. **Personal Data Sheet for Practising Architects:**

This was designed to obtain background information concerning practising architects, and includes data about their names and gender, along with the duration of their experience. This tool is given in appendix VI.

8. **Perceived Effectiveness of Education Scale:** (Wakpainian 1998).

The researcher has used the goal attainment approach for the study of effectiveness of architectural education. One of the objectives of the research is to study the institutional outcomes in terms of discrepancy between the actual and the expected performances of architectural education.
The researcher scrutinised the available readymade tools related to the present research, and selected the tool named ‘Perceived Effectiveness of Education Scale’ (Wakpainjan, 1998)

This scale was used to study the perceptions of students, teachers, and principals regarding the following:

a) Expected Performance of Functions of Architectural Education.

b) Actual Performance of Functions of Architectural Education

Each statement of the tool is followed by two major column-headings: ‘Functions as expected to be performed’ and ‘Functions as actually performed’. These are further divided into three responses each. The responses indicate the degree of performance as follows.

GE: Performed to a Great Extent
SE: Performed to a Small Extent
NAA: Performed Not At All

These responses are assigned the scale values as follows

GE: 3
SE: 2
NAA: 1

Face Validity and Content Validity of the tool: The scale originally included 50 statements. This scale was given to the panel of seven experts to ascertain its face validity and content validity. The experts were asked to give their comments regarding the relevance of each statement. The statements, which were not relevant for architectural education, were removed, and finally 43 statements were retained.
**Reliability of the tool:** The tool was administered to 35 students. Their responses were assigned the score values. The reliability coefficient of the tool, computed by split half method, was found to be 0.90.

The following are some examples of items in this scale.

<table>
<thead>
<tr>
<th>In my opinion the functions of the Architectural Education</th>
<th>As expected to be performed</th>
<th>As actually performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Enhancement of quality of life</td>
<td>GE</td>
<td>SE</td>
</tr>
<tr>
<td>2. Improvement of social status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Development of reflective thinking</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The minimum and the maximum possible scores on this scale are 43 and 129 respectively. The entire tool is given in the Appendix VII.

9) **Self-Appraisal Questionnaire for Principals:** D'Souza and Prabhakar (1987).

The present research aims at studying the institutional systems, as perceived by students, teachers, and principals of colleges of architecture.

Management of institutional activities is an important task of an institutional system. Hence, as an administrative head, the principal's role is of paramount importance.

The managerial behaviour and professional awareness of principals may be different in different colleges.

For the present research, Self-Appraisal Questionnaire for Principals is used to collect data from principals regarding their own performance and the performance of their respective colleges. This questionnaire obtains information about the following aspects:

1. Institutional policy, goals, and objectives.

2. Professional knowledge and awareness of principals.
6. Staff selection and Development.
7. Curriculum development.
8. Time management.
9. PRO activity.

The questionnaire is semi-structured, and allows the principals to elaborate upon their answers. The researcher conducted a dry run, to ensure the clarity and feasibility of the tool.

This tool is given in the Appendix VIII.

**COLLECTION OF DATA**

The researcher personally visited all the colleges of architecture. Though the research does not use qualitative aspects such as participant observations and interviews, these visits helped the researcher to collect and understand information regarding the institutions given by principals and teachers.

A) With prior permission from the respective college principals, the tools were given to students and teachers. Students of semester VIII were administered the following tools:

1. Personal Data Sheet
2. Institutional Environment Perception Scale for students
3. Institutional System Opinionnaire
4. Perceived Effectiveness of Education Scale
The following tools were administered to teachers:

1. Personal Data Sheet
2. Institutional Environment Perception Scale for teachers
3. Institutional System Opinionnaire
4. Perceived Effectiveness of Education Scale

Self-Appraisal Questionnaire was administered to principals of colleges of architecture, and an oral discussion was held with them wherever necessary to understand their views explicitly. The principals were also administered the tools meant for teachers.

The general information regarding the institutions was obtained as per the Institutional Description Inventory.

Practising architects were administered Part B and Part C of the Institutional Systems Opinionnaire, to seek their opinions on strengths and weaknesses of the course, and to obtain the suggestions for improvement in the course.

B) Data on college results: In order to collect data regarding institutional output in terms of college results in university examinations, the researcher personally studied the results for university examinations for last three years. The data for results of each college were collected for the following examinations:

Third Year Architecture Semester VI
Fourth Year Architecture Semester VIII
Fifth Year Architecture Semester IX
Fifth Year Architecture Semester X
Data for results for these examinations were collected for April and October examinations, conducted in 1997, 1998, and 1999. Thus data were collected for twenty-four examinations (eight per year).

**Quantification of College Results**

The results of each college for each examination were first converted into percentages as follows:

\[
\text{Percentage of students in each class} = \frac{\text{Number of students obtaining the class}}{\text{Total Number of students appeared for the examination}} \times 100
\]

The percentages of each class is calculated as follows:

<table>
<thead>
<tr>
<th>Class Obtained</th>
<th>No. Of Students In Each Class</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class</td>
<td>I</td>
<td>(%) I = (I/N) X100</td>
</tr>
<tr>
<td>Second Class</td>
<td>II</td>
<td>(%) II = (II/N) X100</td>
</tr>
<tr>
<td>Pass Class</td>
<td>P</td>
<td>(%) P = (P/N) X100</td>
</tr>
<tr>
<td>Failed</td>
<td>F</td>
<td>(%) F = (F/N) X100</td>
</tr>
<tr>
<td>Total</td>
<td>N</td>
<td>---</td>
</tr>
</tbody>
</table>

These percentages were given weightage as follows:

\[
\text{Weighted Score: } 3 \quad 2 \quad 1 \quad 0
\]

The obtained summated college result score (OSCRS) for each examination was then computed as follows:

\[
\text{OSCRS} = [(\%) F \times 0] + [(\%) P \times 1] + [(\%) II \times 2] + [(\%) I \times 3]
\]

However, it must be noted here, that the results of the students depend not only on the institution, its policies, practices, and environment, but also on students' ability, motivation, study habits, home background and so on. Thus, for any examination result, it is expected that some students will fail, and others will obtain first, second, or
pass class, on account of their own personal characteristics. If it is assumed that students' ability is normally distributed, then as Table A (Garrett)\textsuperscript{17}, percentage of students getting first, second and pass class and those failing are obtained as follows:

The total range of normal probability curve is from $-3 \sigma$ to $+3 \sigma$ i.e. 6 $\sigma$. When this is divided by number of groups i.e. 4, the range of each group is $1.5 \sigma$, which corresponds to 43.32% from the mean, thereby dividing the percentage of students in each class as follows:

<table>
<thead>
<tr>
<th>Class Obtained</th>
<th>(%) of Students in each Class in a Normal Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>6.68 %</td>
</tr>
<tr>
<td>II</td>
<td>43.32 %</td>
</tr>
<tr>
<td>P</td>
<td>43.32 %</td>
</tr>
<tr>
<td>Fail</td>
<td>6.68 %</td>
</tr>
</tbody>
</table>

These percentages are considered as the expected percentage of students who fail, or obtain first, second, or pass class on account of their ability, inspite of the institution. By assigning the weighted scale values to these expected percentages in a normal distribution, the expected summated college result score (ESCRS) for each examination is computed as follows:

\[
\text{ESCRS} = (6.68 \times 0) + (43.32 \times 1) + (43.32 \% ) + (6.68 \times 3) = 150.
\]

The weighted result score for each examination,

\[
\text{WRS} = \frac{\text{OSCRS}}{\text{ESCRS}} = \frac{\text{OSCRS}}{150}
\]

\[
\Sigma \text{WRS}
\]

The Weighted College Result Score, $\text{WCRS} = \frac{\Sigma \text{WRS}}{\text{Number of examinations}}$

where $\Sigma \text{WRS}$ is the sum of weighted result scores for those examinations.
ANALYSIS OF DATA

The researcher has done both qualitative and quantitative analysis of data.

Qualitative analysis: The qualitative analysis for the present study is conducted with reference to the following variables:

1. Students, teachers', and principals' opinions concerning inputs, processes, and outputs of a college of architecture.
2. Self-appraisal of principals of different colleges regarding their own performance, and performance of their respective colleges.
3. Strengths and weaknesses of the course, as perceived by students, teachers, principals, and practising architects.
4. Suggestions for improvement given by students, teachers, and practising architects

The data were analysed qualitatively by using percentages and/or verbal, logical descriptions and reasoning.

Quantitative analysis: The quantitative analysis for the present research is done for ascertaining gender differences and college-wise differences in the students' and teachers' perceptions of the following variables:

1. Total Institutional Environment and its dimensions.
2. Expected performance of functions of architectural education.

The quantitative analysis is also used to ascertain the relationship of institutional environment with the institutional output in terms of:
a) Discrepancy between actual performance and expected performance of architectural education,

b) College results.

**TECHNIQUES OF ANALYSIS OF QUANTITATIVE DATA**

The contribution of statistical methods is considerably high in the general processes of analysing the data. In the present study, two types of analyses are adopted.

1. **Descriptive Analysis**
2. **Inferential Analysis**

**Descriptive Analysis:**

This type of analysis is necessary to establish normality of the distribution of the scores on the data, so that appropriate techniques can be employed for testing the null hypotheses. Descriptive analysis is useful in studying the characteristics of a particular group of individuals. The generalisations made through the descriptive analysis of one group of individuals cannot be extended beyond that group. The statistical techniques used by the researcher for the descriptive analysis are as follows:

1. Measures of central tendency, which include the Mean, Median, and Mode.
2. Measures of variability, which include Standard Deviation, Skewness, and Kurtosis.
3. Estimation of population parameters of Mean and SD.
4. Graphical methods which include frequency polygon graphs, bar diagrams, and pie charts.
Inferential Analysis

This is also known as the testing of hypotheses. It involves the use of statistical techniques in order to arrive at generalisations and conclusions about the data. It is used to compare the groups and to ascertain the relationships between the variables. Generalisations arrived at through inferential analysis can be extended to infer population parameters.

The present study includes the following statistical techniques:

1. *t* test is used to ascertain gender differences, and student-teacher differences in the variables of the study.

2. Analysis of variance (ANOVA) is used to ascertain college-wise differences in the variables.

3. Pearson’s product-moment coefficient of correlation is calculated to ascertain the following relationships:
   - The relationships between the actual performance of functions of architectural education with total institutional environment and its dimensions, as perceived by students, as well as by teachers.
   - The relationships of the discrepancy scores with total institutional environment and its dimensions as perceived by students, as well by teachers.

4. Spearman’s rank-difference coefficient is calculated to ascertain the following relationships:
   - The relationship of college results with total institutional environment and its dimensions as perceived by students from different colleges.
   - The relationship of college results with actual performance of functions of architectural education as perceived by students from different colleges.
• The relationship of college results with discrepancy scores of students of different colleges.

5. Z-test is used to ascertain the differences in the coefficients of correlations.

6. Omega-square estimate is computed to assess the magnitude of differences associated with gender and college.

THE CRITERIA OF APPRAISAL OF ARCHITECTURAL EDUCATION

The aim of the present study is to appraise architectural education. The present study has already identified the output and environmental variables of architectural education.

Here, the criteria of appraising architectural education are identified as follows:

I) Perceived effectiveness of architectural education.

II) Effectiveness ratio of architectural education.

III) Extent of conduciveness of total institutional environment and its dimensions.

IV) Consistency in architectural education.

V) Extent of contribution of total institutional environment towards institutional outputs.

These criteria are described here in detail.

I) Perceived Effectiveness of Architectural Education:

The system of architectural education is said to be effective if the findings of the study are as follows:

a) The Discrepancy Scores (DS) are positive.

The extent of effectiveness using DS is determined as per table 3.8, as follows:
TABLE 3.8
THE MAGNITUDE OF EFFECTIVENESS IN TERMS OF DS

<table>
<thead>
<tr>
<th>Value of DS</th>
<th>Magnitude of Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>-86.0 to -68.9</td>
<td>High Ineffectiveness</td>
</tr>
<tr>
<td>-68.8 to -51.7</td>
<td>Substantial Ineffectiveness</td>
</tr>
<tr>
<td>-51.6 to -34.5</td>
<td>Moderate Ineffectiveness</td>
</tr>
<tr>
<td>-34.4 to -17.3</td>
<td>Low Ineffectiveness</td>
</tr>
<tr>
<td>-17.2 to -0.1</td>
<td>Negligible Ineffectiveness</td>
</tr>
<tr>
<td>0</td>
<td>Marginal Effectiveness</td>
</tr>
<tr>
<td>0.1 to 17.2</td>
<td>Negligible Effectiveness</td>
</tr>
<tr>
<td>17.3 to 34.4</td>
<td>Low Effectiveness</td>
</tr>
<tr>
<td>34.5 to 51.6</td>
<td>Moderate Effectiveness</td>
</tr>
<tr>
<td>51.7 to 68.8</td>
<td>Substantial Effectiveness</td>
</tr>
<tr>
<td>68.9 to 86.0</td>
<td>High Effectiveness</td>
</tr>
</tbody>
</table>

These values of DS have been identified, keeping in mind the fact that the minimum possible scores on both EPFAES and APFAES are 43, whereas the maximum possible scores on both are 129.

b) There is a significant, positive, and perfect association between APFAES and EPFAES, with mean APFAES being greater than mean EPFAES.

The extent of effectiveness of architectural education can be determined on the basis of magnitude of relationships, as per table 3.9, as follows:

TABLE 3.9
MAGNITUDE OF RELATIONSHIPS

<table>
<thead>
<tr>
<th>Value of ‘r’</th>
<th>Magnitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00 to 0.20</td>
<td>Negligible.</td>
</tr>
<tr>
<td>0.20 to 0.40</td>
<td>Low.</td>
</tr>
<tr>
<td>0.40 to 0.60</td>
<td>Moderate.</td>
</tr>
<tr>
<td>0.60 to 0.80</td>
<td>Substantial.</td>
</tr>
<tr>
<td>0.80 to 1.00</td>
<td>High.</td>
</tr>
</tbody>
</table>
c) The college results are very high.

The magnitude of college results in terms of Weighted College Result Scores on a scale of 100 can be determined as per table 3.10, as follows:

**TABLE 3.10**

**MAGNITUDE OF EFFECTIVENESS WITH RESPECT TO WEIGHTED COLLEGE RESULT SCORES**

<table>
<thead>
<tr>
<th>Value of WCRS</th>
<th>Magnitude of effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 20</td>
<td>Negligible.</td>
</tr>
<tr>
<td>21 to 40</td>
<td>Low.</td>
</tr>
<tr>
<td>41 to 60</td>
<td>Moderate.</td>
</tr>
<tr>
<td>61 to 80</td>
<td>Substantial.</td>
</tr>
<tr>
<td>81 to 100</td>
<td>Very High</td>
</tr>
</tbody>
</table>

II) Effectiveness Ratio of Architectural Education:

Effectiveness ratio = Mean APFAES / Mean EPFAES.

The extent of effectiveness or ineffectiveness of architectural education can be determined using this criterion as follows:

Theoretically, the range of this ratio can be between 0.33 (43/129) and 3.00 (129/43). However, in reality, mean APFAES of 129 and mean EPFAES of 43 can occur very rarely, as lack of expectations along with high level of actual performance of functions is not possible, in general. Hence, these magnitudes only represent theoretically possible values.
### TABLE 3.11
**MAGNITUDE OF EFFECTIVENESS WITH RESPECT TO EFFECTIVENESS RATIO**

<table>
<thead>
<tr>
<th>Value of Ratio</th>
<th>Magnitude of Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.33 to 0.46</td>
<td>High Ineffectiveness</td>
</tr>
<tr>
<td>0.47 to 0.59</td>
<td>Substantial Ineffectiveness</td>
</tr>
<tr>
<td>0.60 to 0.72</td>
<td>Moderate Ineffectiveness</td>
</tr>
<tr>
<td>0.73 to 0.85</td>
<td>Low Ineffectiveness</td>
</tr>
<tr>
<td>0.86 to 0.99</td>
<td>Negligible Ineffectiveness</td>
</tr>
<tr>
<td>1.00 to 1.40</td>
<td>Negligible Effectiveness</td>
</tr>
<tr>
<td>1.41 to 1.80</td>
<td>Low Effectiveness</td>
</tr>
<tr>
<td>1.81 to 2.20</td>
<td>Moderate Effectiveness</td>
</tr>
<tr>
<td>2.21 to 2.60</td>
<td>Substantial Effectiveness</td>
</tr>
<tr>
<td>2.61 to 3.00</td>
<td>High Effectiveness</td>
</tr>
</tbody>
</table>

The extent of conduciveness of the total institutional environment and its dimensions can be determined by the value of percent means as follows:

### TABLE 3.12
**EXTENT OF CONDUCIVENESS OF TIES AND ITS DIMENSIONS**

<table>
<thead>
<tr>
<th>Value of percent means</th>
<th>Extent of conduciveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-20</td>
<td>Very low/negligible</td>
</tr>
<tr>
<td>20-40</td>
<td>Low</td>
</tr>
<tr>
<td>40-60</td>
<td>Moderate</td>
</tr>
<tr>
<td>60-80</td>
<td>Substantial</td>
</tr>
<tr>
<td>80-100</td>
<td>Very high</td>
</tr>
</tbody>
</table>
IV) Consistency in Architectural Education:

The consistency in architectural education is established if there is no significant difference in the following scores of students and teachers from different colleges:

i) EPFAES

ii) APFAES

iii) DS

iv) TIES

V) The Extent of Contribution of TIES towards Institutional Outputs:

The contribution of total institutional environment towards APFAES, DS, and WCRS can be established if there is a significant, perfect, and positive relationships between:

i) APFAES and TIES

ii) DS and TIES

iii) WCRS and TIES

The extent of contribution is of TIES towards APFAES, DS, and WCRS can be determined on the basis of the magnitude of relationships as per the criteria given in table 3.9.
REFERENCES:


