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4.1. Introduction

To carry out any type of investigation, data must be gathered to test the hypothesis. Many different methods and procedures have been developed to aid in the acquisition of data. They are the tools of data collection. These tools employ distinctive ways of describing and qualifying data. Each is appropriate, as John W. Best and James V. Khan (1992) say, in a given situation like the tools in the carpenter’s chest. These tools are administered on the selected sample. The selection of sample should be described in this section. The reader should be able to understand exactly from where and how the sample was selected. The data gathering devices and the methods of analysis should also be described for further better understanding of the thesis. Therefore, the details of methodology namely construction of tools, development of the tools, description of the tools, sample of the study, collection of data, scoring procedure and the statistical techniques employed in the analysis of data are presented in this chapter.

4.2. Construction of Research Tools

Every researcher needs certain data gathering devices. Each of them is particularly appropriate for certain sources of data, yielding information of the kind and in the form that can be most effectively used, though they may be different from one or the other in their complexity, design, administration and interpretation. Different types of instruments have been used in school effectiveness studies conducted by the investigators both in India and abroad.
The tools used in school effectiveness studies conducted in foreign countries are: survey instruments, interview, video-based discussion, observation, school and community documents, attitude scale, state mandated test, questionnaire, case study designs, inventory, Junior certificate examination, primary school leaving examination index, site visitation, parent perception scale, authors’ experiences, school climate inventory, classroom climate inventory, profile of school, leadership behaviour description questionnaire, index of perceived organisational effectiveness, administrative behaviour scale, leadership practices inventory survey, instructional management rating scale, school inspection reports, school comprehensive tests of basic skills scores, instructional management rating scale, instructional leadership questionnaire, my class inventory and secondary school development questionnaire.

In India, the investigators of school effectiveness studies have used the tools such as - school equipment checklist, Intermediate colleges educational leadership behaviour description questionnaire, teacher morale inventory, achievement test, school information schedule, teacher attitude scale, student information blank, group discussions, case study, school schedule, marks in preceding two annual examinations, Cassel’s leadership ability evaluation inventory, quarterly test, organisational climate description questionnaire, students’ attendance register, opinionnaire for officers, school input inventory, personal data sheet of teachers, school process description scale, socio-economic status inventory, official records, school effectiveness and survey questionnaire.

Tools available in other parts of the world can not be used due to their unsuitability to the Indian situation. Standardised tools to measure the physical factors, curricular factors and the administrative factors of school effectiveness at primary stage are also not available in India. So the investigator constructed the following tools of his own for the purpose of the study:
1. Rating Scale to Assess the Physical Factors related to School Effectiveness at Primary Stage.
2. Rating Scale to Assess the Curricular Factors related to School Effectiveness at Primary Stage.
3. Rating Scale to Assess the Administrative Factors related to School Effectiveness at Primary Stage and
4. Students’ Information Schedule to Collect the Personal Information of the Students and their Marks in Annual Examination of Standard V.

4.3. Development of the Tools

In developing the above said tools, the investigator has thoroughly reviewed the literature available in the area of school effectiveness and learning achievement. Based on the review of literature, the various physical factors of primary schools, curricular factors and administrative factors of primary teachers were listed out. Under each factor several statements have been given with four responses in the form of a, b, c and d having the scores 1, 2, 3 and 4 respectively. In fact, these scores serve as a measure of that particular factor of school effectiveness. These four point rating scales assess the physical factors of school effectiveness, curricular factors of school effectiveness, and administrative factors of school effectiveness.

Each school effectiveness rating scale of physical factors, curricular factors and administrative factors was given to the primary school teachers and headmasters apart from the people working in the Department of Education at the University/college levels. They were requested to review the items of the rating scales in terms of their coverage of the content, language and their suitability under the particular factor. Based on their comments, certain statements were revised, deleted and added. At this stage, there were 39 items in the Rating Scale to Assess the Physical Factors of School Effectiveness at Primary Stage, 50 items in the Rating Scale to Assess the Curricular Factors of School Effectiveness at Primary
Stage and 33 items in the Rating Scale to Assess the Administrative Factors of School Effectiveness at Primary Stage.

In order to study the learning achievement of Standard V students, a Students' Information Schedule has been developed. This schedule consists of the personal information about the students and the marks obtained by them in their annual examination in different subjects of Standard V level.

4.4. Description of the Tools

The tools of the present study were constructed with certain factors which in turn include a number of items. They are described in detail here under.

4.4.1. Rating Scale to Assess the Physical Factors Related to School Effectiveness at Primary Stage

This Rating Scale consists of Basic Facilities, Supplementary Facilities, Techno-Pedagogical Facilities and Support Services Provided in the School, having together 39 items.

The basic facilities consist of 13 items. The facilities include classroom space, buildings, instructional materials, drinking water, toilet and furniture. The supplementary facilities contain 10 items. The facilities included are play facilities, furniture for students, school bell, dust bin, maths kit, mini tool kit to develop motor skills through work experience activities, extra reading materials, electric facility, water facility and medical facility. In the techno-pedagogical facilities, there are 8 items. The facilities are radio, tape recorder, television, overhead, film and filmstrip projectors, science laboratory and library. The support services provided in the school consist of 8 items. The support services include community support services, health and sanitary services, savings scheme, road and transport, educational institutions of pre and post primary stage.

The items of the rating scale have been formulated with the background of (i) the basic facilities of the primary schools available in common (ii) the Operation
Blackboard Scheme which provided minimum essential facilities to all the primary
schools to supplement the basic facilities and (iii) the Kothari Commission Report
(1964-1966) on primary stage of education in India which has recommended for the
constitution of school complexes in order to make the techno-pedagogical facilities
of the secondary schools available for the primary schools to improve the quality of
education at primary stage and has also recommended for the establishment of
Parent Teacher Association and Village Education Committee for qualitative
improvement of primary education. It has stressed for professional inputs through
special orientation programmes for primary teachers in respect of the support
services provided in the school.

4.4.2. Rating Scale to Assess the Curricular Factors Related to School
Effectiveness at Primary Stage

Enhancing the learning achievement of primary children is one of the main
thrusts of New Education Policy, 1986 Revised in 1992 of India. In order to achieve
this goal, inservice trainings are given to the primary teachers through special
orientation programmes. District Institutes of Education and Training have been
constituted and all the primary teachers are empowered to increase the learning
achievement of the primary school children. The professional capabilities of the
primary teachers are increased with respect to curricular and administrative factors.
This rating scale consists of factors related to curriculum planning, teaching,
learning and evaluation, Teacher' job preparation and Teacher' job satisfaction.

There are 8 items in the factors related to curriculum planning. The factors
are: organising the lessons, motivating techniques, time allotment for co-curricular
activities, provision of extra learning time for pupils and allotment of workload. 20
items have been included in the factors related to teaching, learning and evaluation.
The factors are: awareness of purpose of teaching based on universalisation of
primary education, extent of using low cost and no cost and other teaching aids,
engaging pupils in extra situations for learning, teaching slow learners. assistance in
teaching, self evaluation of teaching, formative and summative evaluation of pupils. There are 11 items in the factors of teachers' job preparation. The factors include teachers’ knowledge of students’ background, impartiality towards students, trust worthiness to students, academic input and professional input. In the factors of teachers’ job satisfaction, there are 8 items. The factors are: teachers’ job satisfaction about the self, about the colleagues, about the students and about the society.

4.4.3. Rating Scale to Study the Administrative Factors Related to School Effectiveness at Primary Stage

This Rating Scale consists of Classroom Management, Resource Management and Liaison between Parents, Teachers and Administration. The factors of the classroom management consist of 10 items. They are: scheduling activities, care for students’ seating arrangement, care for students’ discipline and arranging for slow learners’ improvement. In the factors of resource management, there are 15 items. The factors included are: time management, human resource management and material management. The factors of liaison between parents, teachers and administration consist of 8 items. The aspects are: liaison between parents and teachers and liaison between parents and administration.

These factors are intended for rating with a view to find how the primary teachers should practise in these factors in addition to their routine teaching work so that the learning achievement of primary school children will improve.

These three rating scales are given as Appendices-I, II and III

4.4.4. Students' Information Schedule to Collect the Personal Information of the Students and Their Marks in the Annual Examination of 5th Standard

This tool is designed in such a way as to study the personal informations of the students (pupils’ sex, their community, sex of the teacher, location of school.
type of school, number of family members, educational status of parents and
religion of the students) and their learning achievement in different subjects (Tamil,
English, Mathematics, Environmental Studies-II / Science and Environmental
Studies-I / Social Science) and subjects as a whole in 5th standard. This tool is
given in Appendix-IV.

4.5. Scoring Procedure

For purposes of statistical analysis, the data collected should be quantified. In order to facilitate quantification, the following scoring procedure was adopted:

The Rating Scales were supplied to the teachers and headmasters of primary
schools personally and they were requested to give responses on them. In order to
quantify the responses a uniform scoring procedure has been followed. Four
responses have been provided against each item of all the three rating scales in the
form of a, b, c and d. The responses for every item were structured in such a way
that the scoring will be 1, 2, 3 and 4 for a, b, c and d respectively. The scores of the
teachers and headmasters of every school on each item were averaged and the
average scores were considered as individual school scores of that particular factor
of school effectiveness.

4.6. The Pilot Study

The pilot study is used to decide possible activities, locations and people that
the researcher wanted to include in his/her study. It helps to find out the feasibility
of the study also. It is useful to ascertain the suitability of the tools. It is helpful to
eliminate ambiguities of the words used in the tools and to find out if the
respondents (the headmasters and the teachers of the primary schools in the present
study) have felt any difficulty in responding to the tools supplied to them.

Primary schools were selected on the basis of simple random technique. They include Government schools, Private aided non-minority schools and Private
aided minority schools amounting to 10.7% of primary schools situated in the study
area. The headmasters and the teachers of these schools were met personally in their respective schools who amounted to 140 in total. The purpose of the study was explained to them. They were assured that the responses and informations given by them to the rating scales would be kept confidential and they would be used for research purpose only. Thus a good rapport was established with them.

The rating scales were supplied in person to the headmasters and teachers of the primary schools selected for the pilot study. It was emphasised that no item should be omitted. They were also told that no time limit was fixed to give their responses to the rating scales. Later, the rating scales were collected from them personally. And, the reliability and validity of the rating scales have been established.

4.7. Reliability of the Tools Used in the Study

Reliability means stability of test scores. A test score is reliable when we have reasons for believing the score to be stable and trustworthy (Garrett, E Henry and Woodworth, R.S. 1981). And the correlation of the test with itself is called the reliability co-efficient of the test.

There are four procedures in common used for computing the reliability co-efficient of a test. They are:

1) Test-retest
2) Alternate or parallel forms
3) Split-half technique and
4) Rational equivalence.

Of these four procedures, the split-half method is regarded by many as the best of the methods for measuring test reliability (Garrett, E Henry and Woodworth, R.S 1981). One of the main advantages is the fact that all data for computing reliability are obtained upon one occasion so that variations brought about by differences between the two testing situations are eliminated.
In the split-half method, the test is first divided into two equivalent “halves” and the correlation is found for these half-tests by using Karl Pearson’s correlation co-efficient formula:

\[
r = \frac{N \sum XY - \Sigma x \Sigma y}{\sqrt{[N \Sigma X^2 - (\Sigma X)^2][N \Sigma Y^2 - (\Sigma Y)^2]}}
\]

Where

- \( r \) = correlation co-efficient
- \( x \) = Score obtained in one half of the test
- \( y \) = score obtained in another half of the test
- \( \Sigma X \) = sum of obtained x values
- \( \Sigma Y \) = sum of obtained y values
- \( \Sigma X^2 \) = sum of squared x values
- \( \Sigma Y^2 \) = sum of squared y values
- \( (\Sigma X)^2 \) = Squared value of the sum of obtained x values
- \( (\Sigma Y)^2 \) = Squared value of the sum of obtained y values
- \( N \) = Number of cases

From the reliability of the half test, the self-correlation of the whole test is then estimated by the Spearman-Brown prophecy formula:

Where,

\[
r_{11} = \frac{2r \frac{1}{2} - 1}{2r \frac{1}{2} - 1}
\]

\( r_{11} \) = reliability co-efficient of the whole test

\( 2r \frac{1}{2} \frac{1}{11} \) = reliability co-efficient of the half-test, found experimentally
In the present study, the investigator has used the split-half method to compute the reliability of the rating scales. The items contained in the rating scales are split into two halves. The odd numbered items (1, 3, 5, 7 etc.) constitute one half and the even numbered items (2, 4, 6, 8 etc.) the other half.

4.7.1. Reliability of the Rating Scale to Assess the Physical Factors related to School Effectiveness at Primary Stage

\[ r = \frac{N \Sigma XY - \Sigma X \Sigma Y}{\sqrt{[N \Sigma X^2 - (\Sigma X)^2][N \Sigma Y^2 - (\Sigma Y)^2]}} \]

\[ (140 \times 354287.1) - (7498.801)(6500.069) \]

\[ \sqrt{[(140 \times 408648) - (7498.801)^2][(140 \times 311624)(6500.069)^2]} \]

\[ = 49600194 - 48742723.9172 \]

\[ \sqrt{(57210720 - 56232016.4376)(43627360 - 42250897.004)} \]

\[ = 857470.0828 \]

\[ \sqrt{(978703.5624)(1376462.996)} \]

\[ = 857470.0828 \]

\[ 989.29 \times 1173.2275 \]

\[ = 857470.0828 \]

\[ = 1160662.2 \]

\[ = 0.74 \]

From this half-test reliability, the whole test reliability is calculated by using Spearman Brown formula:
This obtained reliability value of whole test (0.85) is found to be high.

4.7.2. Reliability of the Rating Scale to Assess the Curricular Factors related to School Effectiveness at Primary Stage

\[
r = \frac{2r_{1/2}}{1 + r_{1/2}} = \frac{2 \times 0.74}{1 + 0.74} = \frac{1.48}{1.74} = 0.85
\]

From this half-test reliability, the whole test reliability is calculated by using Spearman Brown formula:

\[
r = \frac{2r_{1/2}}{1 + r_{1/2}} = \frac{2 \times 0.60}{1 + 0.60} = \frac{1.2}{1.6} = 0.75
\]

This obtained reliability value of whole test (0.75) is found to be high.
4.7.3. Reliability of the Rating Scale to Assess the Administrative Factors related to School Effectiveness at Primary Stage

\[
 r = \frac{N \sum XY - \sum X \sum Y}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}} \\
= \frac{61095748 - 60604171}{\sqrt{(63411320 - 62758084)(59402140 - 58524183)}} \\
= \frac{491577}{\sqrt{653236 \times 877957}} \\
= \frac{491577}{808.23 \times 936.99} \\
= \frac{491577}{757303.42} \\
= 0.65
\]

From this half-test reliability the whole test reliability is calculated by using Spearman Brown Formula:

\[
 r = \frac{2r_{1/2}}{1 + r_{1/2}} \quad \frac{2 \times 0.65}{1 + 0.65} = \frac{1.3}{1.65} = 0.79
\]

This obtained reliability value of whole test (0.79) is found to be high.

The value of reliability co-efficient (r) from ±0.7 to ±1.00 denotes high to very high relationship (Henry, E. Garret and Woodworth, R.S. 1981). It is found
from the above that the values of reliability of the rating scales used in the present study are very high. So these rating scales are highly reliable.

4.8. Validity

The validity of a test or of any measuring instrument, depends upon the fidelity with which it measures what it purports to measure. It depends upon the efficiency with which it measures, whatever it intends to measure. One kind of validity concerns the degree to which the test or the measuring instrument measures what it claims to. According to John W. Best (1989), “Validity is the quality of a data gathering instrument or procedure that enables it to measure what is supposed to measure”.

Validity is a relative term. It must be considered in relation to the purpose it is to serve. It is specific in relation to some definite situation. A test is valid for a particular purpose or in a particular situation—it is not ‘generally’ valid (Garret, E. Henry and Woodworth, R.S. 1981).

The index of reliability is sometimes taken as a measure of validity (Garret, E. and Woodworth, R.S. Henry, 1981). The correlation co-efficient gives the relationship between obtained scores and their theoretical true counterparts. It indicates the degree to which the test is capable of accomplishing certain goals. Several kinds of validity are identified, depending upon the purpose for which the research tool is to be used.

Face Validity

It refers not to what the test necessarily measures but to what it appears to measure (Anastasi, 1957). The rating scales to Assess the Physical Factors, Curricular Factors and to study the Administrative Factors Related to School Effectiveness at Primary Stage were given to twenty experts and face validity has been ensured. There has been cent per cent agreement among judges regarding the relevance of items included in the three Rating Scales.
Content Validity

The items in the Rating Scales to Assess the Physical Factors and Curricular Factors and to study the Administrative Factors Related to School Effectiveness at Primary Stage are selected based on the review of related literature and consultations with related field experts. Their suggestions have been taken into account to enhance the contents and quality of the items. Therefore, these Rating Scales possess the content validity.

Intrinsic Validity

The intrinsic validity is expressed by the square root of the proportion of true variance, that is, the square root of the reliability.

(i) The intrinsic validity of the Rating Scale to Assess the Physical Factors Related to School Effectiveness at Primary Stage is $\sqrt{0.85} = 0.92$. It means that this instrument measures true ability to the extent expressed by an $r$ of $0.92$.

(ii) The intrinsic validity of the Rating Scale to Assess the Curricular Factors Related to School Effectiveness at Primary Stage is $\sqrt{0.75} = 0.87$. It means that this instrument measures true ability to the extent expressed by an $r$ of $0.87$.

(iii) The intrinsic validity of the Rating Scale to Study the Administrative Factors Related to School Effectiveness at Primary Stage is $\sqrt{0.77} = 0.89$. It means that this instrument measures true ability to the extent expressed by an $r$ of $0.89$.

4.9. Locale of the Study

Tamil Nadu is one of the four southern states of India extending up to Cape Comorin in the south. It is bounded by the Bay of Bengal in the east; by Kerala in the west; Andhra Pradesh and Karnataka in the north and by the Indian Ocean in the south. The state of Tamil Nadu comprises of Nineteen Revenue Districts. It has been divided into seventy six educational districts for the purpose of effective administration. One among them is Aruppukottai Educational District which has been identified as the study area. The principal agencies that manage primary
schools in Tamil nadu are the State Government and private management, both minority and non-minority.

4.10. Sample of the study

It was decided to select Aruppukottai Educational District as the study area. It consists of five educational blocks. They are (i) Aruppukottai (ii) Kariapatti (iii) Narikudi (iv) Tiruchuli and (v) Sathur. Out of these five blocks, three blocks were selected randomly by using simple random sampling technique. The selected three blocks are: (i) Aruppukottai (ii) Kariapatti and (iii) Tiruchuli. These educational blocks have different types of primary schools namely (a) Government Schools, (b) private aided non-minority schools and (c) private aided minority schools. All the primary schools having fifth standard, the primary school teachers and headmasters working there and all the pupils studying in 5th standard there were considered as the sample of the study. The details of the sample are given in the table-1.
Table-1: - Sample of the Study

<table>
<thead>
<tr>
<th>Educational Blocks</th>
<th>Schools</th>
<th>Teachers</th>
<th>Students of 5th Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Govt</td>
<td>PANM</td>
<td>PAM</td>
</tr>
<tr>
<td>Aruppukottai</td>
<td>41</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>Kariapatti</td>
<td>86</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Tiruchuli</td>
<td>56</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>Grand Total</td>
<td>183</td>
<td>36</td>
<td>23</td>
</tr>
</tbody>
</table>

Govt. = Government  
PANM = Private Aided Non-Minority  
PAM = Private Aided Minority  
M = Men  
W = Women  
B = Boys  
G = Girls
4.11. Procedure for Data Collection

The printed copies of the personal data sheet along with the Rating Scale to Assess the Physical Factors Related to School Effectiveness at Primary Stage, Rating Scale to Assess the Curricular Factors Related to School Effectiveness at Primary Stage, Rating Scale to Assess the Administrative Factors Related to School Effectiveness at Primary Stage and the Students’ Information Schedule to Collect the Personal Information of the Standard V Students and their Marks in their Annual Examination were supplied personally to teachers and headmasters of the sample schools selected.

All headmasters were met block-wise with the help of the instructions of the Assistant Elementary Education Officers of the respective blocks. They were explained about the purpose of the study and a good rapport was established. The primary school teachers of the respective blocks were communicated about the study through their headmasters and thus a good rapport was made with the teachers also. The printed copies of the tools were supplied to the teachers through their headmasters personally. It was emphasised that no item should be left out. No time limit to respond to the Rating Scales was fixed. Being responsible, the teachers and the headmasters responded to all the items of the tools as per the instructions.

4.12. Statistical Techniques used in the Study

The data obtained from sample schools have been analysed with appropriate statistical techniques.

At the outset, it is intended to study the physical, curricular and administrative factors related to school effectiveness at primary stage. For this, the Mean and Standard Deviation of the total of the obtained raw scores with respect to these factors related to school effectiveness are calculated individually. With the help of Mean and Standard Deviation, these total raw scores corresponding to sample schools are converted into standard scores (z-scores). Based on these z-scores the sample schools are divided into three categories namely poor, moderate
and good in school effectiveness. From this, the number of schools falling under each category has been calculated. The same procedure is followed to categorise the schools on the basis of the physical, curricular and administrative factors related to school effectiveness taken together.

In order to find out the significant differences in physical, curricular and administrative factors related to school effectiveness among different type of schools (Government, Private Aided Non-Minority and Private Aided Minority) and location of schools (Rural and Urban), Mean and Standard Deviation of the scores on different aspects of school effectiveness of each type and location of schools have been calculated. Based on Mean and Standard Deviation, the t-values and F-values have been calculated. When there are two groups, t-test is used to know the significant difference between two groups. F-test has been used to know the significant differences, when more than two groups are involved in the analysis. When F-values are found significant, t-test is used to know exactly which of the two groups have significant difference.

Similarly, to know the significant differences, if any, in the learning achievement of 5th Standard pupils in each subject (Tamil, English, Mathematics, Environmental Studies-II, Environmental Studies-I) and subjects as a whole due to variations in the quality of physical, curricular and administrative factors related to school effectiveness (poor, moderate and good school), Mean and Standard Deviation of the scores on Learning Achievement of pupils studying in schools with different qualities (poor, moderate and good) have been calculated. Based on Mean and Standard Deviation, F-values have been calculated. When F-values are found significant, t-test is used to know exactly which of the two groups have significant difference.

In order to know the relationship (i) between the aspects of school effectiveness and learning achievement and (ii) between the quality of primary education.
schools and learning achievement of 5th Standard pupils in each subject and subjects as a whole, r-values are calculated.

To know the significant differences, if any, in the learning achievement of 5th Standard pupils in each subject and subjects as a whole due to variations in their sex, community, sex of teacher, location of school, type of schools, number of family members, educational status of parents and religion, F values and t values have been calculated on the basis of Mean and Standard Deviation of learning achievement scores of pupils. When there are two groups, t-test is used to know the significant difference between the two groups. F test has been used to know the significant differences, when more than two groups are involved in the analysis. When F values are found significant, t-test is used to know exactly which of the two groups have significant difference.

The analysis and interpretation of the study results are presented in Chapter-V.