CHAPTER – III

Tool Design and Research Methodology
# CHAPTER III

## TOOL DESIGN AND RESEARCH METHODOLOGY

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CHAPTER – III

TOOL DESIGN AND RESEARCH METHODOLOGY

PART A

TOOL DESIGN

3.1 INTRODUCTION

Teaching is an important part in the process of education. It is a relationship which is established among three focal points in education—the teacher, the student and the subject matter. Teaching is the process by which the teacher brings the students and the subject matter together. Investigation on the teaching process needs to study the emotional balance or psychological makeup of teachers too.

Common Wealth Report (1974) states that to be a competent teacher “the teacher must have knowledge of child development, of the material to be taught and suitable methods of teaching, culture of pupils, his skills must enable him to teach, advise and guide his pupils, community and culture with which he is involved”(P.127)¹.

Thus teaching is always a dynamic activity. It is important that the investigator selects an appropriate tool that can measure different variables included in the study. The investigator in this present study uses three tools of which two are standardized and the other one is a self made tool. The investigator describes the rationale of the tools in this chapter.
EDWARDS PERSONAL PREFERENCE SCHEDULE (EPPS)

The personal data schedule consisted of items pertaining to the background factors. The personal data schedule was modified on the basis of the responses of the respondents as well as expert opinions. After eliminating certain items and including certain others the schedule (Appendix-A) was finalized. The standardized tool, Edwards Personal Preference Schedule (EPPS) was developed by Allen L. Edwards. It was standardized for research and counseling purposes to provide quick and convenient measures of a number of relatively independent normal personality variables.

The EPPS provides 15 personality variables viz.,

1. Achievement (ach)
2. Deference (def)
3. Order (ord)
4. Exhibition (exh)
5. Autonomy (aut)
6. Affiliation (aff)
7. Intraception (int)
8. Succorance (suc)
9. Dominance (dom)
10. Abasement (aba)
11. Nurturance (nur)
12. Change (chg)
13. Endurance (end)
14. Heterosexuality (het)

15. Aggression (agg)

The manifest needs associated with each of the 15 Edwards Personal Preference Schedule variables are described as follows.

1. **Achievement**

   To do one’s best, to be successful, to accomplish tasks requiring skill and effort, to be a recognized authority, to accomplish something of great significance, to do a difficult job well, to solve difficult problems and puzzles, to be able to do things better than others, to write a great novel or play.

2. **Deference**

   To get suggestions from others, to find out what others think, to follow instructions and do what is expected, to praise others, to tell others that they have done a good job, to accept the leadership of others, to read about great men, to confirm to custom and avoid the unconventional, to let others make decisions.

3. **Order**

   To have written work neat and organized, to make plans before starting on a difficult task, to have things organized, to keep things neat and orderly, to make advance plans when taking trip, to organize details of work, to keep letters and files according to some system, to have meals organized and a definite time for eating, to have things arranged so that they run smoothly without change.
4. Exhibition

To say witty and clever things, to tell amusing jokes and stories, to talk about personal adventures and experiences, to have others notice and comment upon one’s appearance, to say things, just to see what effect it will have on others, to talk about personal achievements, to be the center of attention, to use words that others do not know the meaning of, to ask questions that others cannot answer.

5. Autonomy

To be able to come and go as desired, to say what one thinks about things, to be independent of others in making decisions, to feel free to do what one wants, to do things that are unconventional, to avoid situations where one is expected to confirm, to do things without regard to what others may think, to criticize those in positions of authority, to avoid responsibilities and obligations.

6. Affiliation

To be loyal to friends, to participate in friendly groups, to do things for friends, to form new friendship, to make as many friends as possible, to share things with friends, to do things with friends rather than alone, to form strong attachments, to write letters to friends.

7. Intracpection

To analyze one’s motives and feelings, to observe others, to understand how others feel about problems, to put one’s self in another’s place, to judge people by why they do things rather than by what they do, to analyze the behaviour of others, to analyze the motives of others, to predict how others will act.
8. Succorance

To have others provide help when in trouble, to seek encouragement from others, to have others be kindly, to have others be sympathetic and understanding about personal problems, to receive a great deal of affection from others, to have others do favors cheerfully, to be helped by others when depressed, to have others feel sorry when one is sick, to have a fuss made over one when hurt.

9. Dominance

To argue for one’s point of view, to be a leader in groups to which one belongs, to be regarded by others as a leader, to be elected or appointed chairman of committees, to make group decisions, to settle arguments and disputes between others, to persuade and influence others to do what one wants, to supervise and direct the actions of others, to tell others how to do their jobs.

10. Abasement

To feel guilty when one does something wrong, to accept blame when things do not go right, to feel that personal pain and misery suffered does more good than harm, to feel the need for punishment for wrong doing, to feel better when giving in and avoiding a fight than when having one’s own way to feel the need for confession of errors, to feel depressed by inability to handle situations, to feel timid in the presence of superiors, to feel inferior to others in most respects.

11. Nurturance

To help friends when they are in trouble, to assist others less fortunate, to treat others with kindness and sympathy, to forgive others, to do small favors for others, to
be generous with others, to sympathize with others who are hurt or sick, to show a great deal of affection toward others, to have others confide in one about personal problems.

12. Change

To do new and different things, to travel, to meet new people, to experience novelty and change in daily routine, to experiment and try new things, to eat in new and different places, to try new and different jobs, to move round the country and live in different places, to participate in new fads and fashions.

13. Endurance

To keep at a job until it is finished, to complete any job undertaken, to work hard at a task, to keep at a puzzle or problem until it is solved, to work at a single job before taking on others, to stay up late working in order to get a job done, to put in long hours of work without distraction, to stick at a problem even though it may seem as if no progress is being made, to avoid being interrupted while at work.

14. Heterosexuality

To go out with members of the opposite sex, to engage in social activities with the opposite sex, to be in love with someone of the opposite sex, to kiss those of the opposite sex, to be regarded as physically attractive by those of the opposite sex, to participate in discussions about sex, to read books and plays involving sex, to listen to or to tell jokes involving sex, to become sexually excited.
15. Aggression

To attract contrary points of view, to tell others what one thinks about them, to criticize others publicly, to make fun of others, to tell others off when disagreeing with them, to get revenge for insults, to become angry, to blame others when things go wrong, to read newspaper accounts of violence.

The Edwards Personal Preference Schedule consists of a number of pairs of statements about things that one may or may not like, about ways which one may or may not feel. The teachers are asked to find out which statement is more characteristic of what they like. They should choose one statement over the other. Other pairs of statements have to do with their likes. The teachers are asked to find out which statement is more characteristic of how they feel. They should choose one statement over the other. Their choices should be a description of their own personal likes and feelings. The teachers are asked to make a choice of every pair of statements and not to skip any. Their choices were recorded on a specially prepared answer sheet. The format of the answer sheet is furnished in the appendix.

Scoring Procedure

On the regular answer sheet the ‘subject’ answers each item by circling the letter A or the letter B next to the corresponding item number on the answer sheet. In reading the following paragraphs on scoring, it may be helpful to refer to the sample of a material answer sheet.

Step 1

The template should be placed over the answer sheet so that the items printed above the three wide slots appear within these slots, insuring correct registration.
Through the three narrow slits running diagonally across the template, draw lines on the answer sheet. A colored pencil is recommended. These lines will go through items 1, 7, 13, 19, 25, 101, 107, 113, 119, 125, 201, 207, 213, 219 and 225. The items crossed out are not to be counted in obtaining the scores for the personality variables.

Through the three wider openings in the template, trace the outline of the openings on the answer sheet. These lines should encompass items 151, 157, 163, 169, 175; 26, 32, 38, 44, 50; 51, 57, 63, 69 and 75. The responses to these items are to be included in the raw scores for the personality variables, but will also be used in the consistency measure.

Step 2

Count the number of A’s encircled in the first row of scores on the answer sheet and record this number at the end of the row in the column labelled ‘r’. Count the number of A’s encircled in each successive row and record the count at the end of that row in column ‘r’. In obtaining these row scores do not count encircled A’s in any item that has been marked out by the diagonal lines drawn in step I.

Step 3

Count the B’s encircled in the first column and record this count in the first (top) row of column ‘c’ at the right of the answer sheet. Count the B’s encircled in each successive rows of column ‘c’. In obtaining these column scores, do not count encircled B’s in any of the items that have been marked out by the diagonal lines drawn in step I.
When step 3 has been completed there will be 15 numbers recorded in column ‘r’ and 15 column ‘c’. Add the two numbers in each row of columns ‘r’ and ‘c’ and record the sums in column ‘s’ directly at the right. The numbers recorded in column ‘s’ are the total raw scores for the 15 personality variables.

As a check on the scoring, add the numbers in column ‘s’. The sum of column ‘s’ must equal to 210.

Each of the 15 personality variables in the EPPS is paired twice with each of the other variables. If , in each of the comparisons, the student has chosen the statement for a given variable as being more characteristic of himself than the statements for the other variables, his score on this particular variable would be 28. This is the maximum score that can be obtained for any given personality variable. In order to obtain a score of 0 for any given variable, in the 28 comparisons in which it appears, as being less characteristic of himself than the paired statements for the other variables.

The higher the score on a particular variable, the more often the subject has chosen the statements for this variable as being descriptive of himself in preference to the statements for the other variables and lower the scores on a particular variable the less often the subject has chosen the statements for this variable as being descriptive of himself in preference to the statements for the other variables.

The raw scores have been converted into T scores with mean of 50 and standard deviation of 10 from T scores.
<table>
<thead>
<tr>
<th>Percentiles</th>
<th>Interpretation</th>
<th>T Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>97 and above</td>
<td>Very high</td>
<td>70 and above</td>
</tr>
<tr>
<td>85-96</td>
<td>High</td>
<td>60-69</td>
</tr>
<tr>
<td>17-84</td>
<td>Average</td>
<td>41-59</td>
</tr>
<tr>
<td>4-16</td>
<td>Low</td>
<td>31-40</td>
</tr>
<tr>
<td>3 and below</td>
<td>Very low</td>
<td>30 and below</td>
</tr>
</tbody>
</table>

These categories are used for finding the levels of personality characteristics.

**Reliability of the EPPS**

The reliability of the Edwards Personal Preference Schedule after its administration to 89 students at the University of Washington who took up the tests twice with a one week interval separating the administrations as given in the original tool by Allen.L.Edwards (1959) is given in table 3.01.

To judge the reliability of the tool in India, a group of 100 B.Ed students (50 from St. Ignatius college of Education, Palayamkottai and 50 from St.Xavier’s college of Education, Palayamkottai, Tamilnadu) was selected. The tool was administered first to the group and after an interval of a week it was administered to the same group again.
Table 3.01

Reliability of the EPPS

<table>
<thead>
<tr>
<th>S.No</th>
<th>Variable in the Original study</th>
<th>In the present study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Achievement</td>
<td>0.74</td>
</tr>
<tr>
<td>2.</td>
<td>Deference</td>
<td>0.78</td>
</tr>
<tr>
<td>3.</td>
<td>Order</td>
<td>0.87</td>
</tr>
<tr>
<td>4.</td>
<td>Exhibition</td>
<td>0.74</td>
</tr>
<tr>
<td>5.</td>
<td>Autonomy</td>
<td>0.83</td>
</tr>
<tr>
<td>6.</td>
<td>Affiliation</td>
<td>0.77</td>
</tr>
<tr>
<td>7.</td>
<td>Intraception</td>
<td>0.86</td>
</tr>
<tr>
<td>8.</td>
<td>Succorance</td>
<td>0.78</td>
</tr>
<tr>
<td>9.</td>
<td>Dominance</td>
<td>0.87</td>
</tr>
<tr>
<td>10.</td>
<td>Abasement</td>
<td>0.88</td>
</tr>
<tr>
<td>11.</td>
<td>Nurturance</td>
<td>0.79</td>
</tr>
<tr>
<td>12.</td>
<td>Change</td>
<td>0.83</td>
</tr>
<tr>
<td>13.</td>
<td>Endurance</td>
<td>0.86</td>
</tr>
<tr>
<td>14.</td>
<td>Heterosexuality</td>
<td>0.85</td>
</tr>
<tr>
<td>15.</td>
<td>Aggression</td>
<td>0.78</td>
</tr>
</tbody>
</table>
TOOL- II

Job Satisfaction Scale (JSS)

To assess the job-satisfaction of Physical Science Teachers of higher secondary schools, the job satisfaction scale of Dr. S. X. Saxena was used (Appendix B). It is a standardized tool and a self administering scale. This scale was administered to a sample of 25 teachers. No time limit was given. The total score of each scale was calculated.

The reliability was calculated by using Kuder and Richardson formula 21. The value of ‘γ’ was found to be 0.72 and the index of reliability was 0.85. The Coefficient is quite high.

Scoring Procedure

All the items except 4 and 29 are positively worded. All these items are given a score of 1 for positive responses except for items 4 and 29 in which case reverse is applicable. The sum of the values gives the job satisfaction scores of the teachers. The total score varies from 0 to 29 showing the lowest job satisfaction to highest job satisfaction of the teachers.

TOOL III

Teaching Competency Scale

The investigator referred number of tools and analysed the merits and demerits of various procedures for collecting data. No standard Indian tool to assess competency of physical science teachers is available. Hence the investigator decided
to structure and validates one for her study based on the following tools as presented by

1) Sathiyagirirajan (1994, P 131-138,150-156)²
   i) Stanford Teacher Competency Appraisal guide
   ii) Instructor Rating Scale of San Jose State College.
   iii) College Teacher Competency-A research report by S.Sathiyagirirajan.


3) Baroda General Teacher Competency Scale-B.K.Passi and M.S.Lalitha (1976, P 19-23)⁴.

   With the consultation of some veteran science faculty members, teacher educators and competent teachers, the investigator constructed a scale for measuring teaching competency.

**Rationale of the tool**

The different dimensions selected in the present study are described below:

**Dimension (1) Planning (Pre-Instructional)**

Before actual classroom teaching or what Jackson calls ‘calm’ part of teaching, a teacher has to perform many tasks. These tasks include:

i) Objectives of the lesson

ii) Content selected

iii) Examples selected

iv) Organization of the content

v) Audio Visual Aids prepared

vi) Demonstrations selected
vii) Pupil activity selected  
viii) Content preparation  

Pre-active behaviour is more or less deliberative. The teacher at this stage hypothesizes about the possible outcome of his action. As the teacher decides what text books to use or how to group the children for reading or whether to notify student’s parents of their poor performance, his behaviour is at least analyzable.

**Dimension (2) Instructional:**

This is actual classroom teaching. At this stage, the teacher uses a number of strategies for achieving the goals already set. They are

i) Teacher tested the previous knowledge  
ii) Content was presented  
iii) Movement from one part of the lesson to another  
iv) Questions asked  
v) Explanation of concepts, facts and principles  
vi) Demonstrations  
vii) Concepts, facts and principles were illustrated  
viii) Pupil participation strategies  
ix) Black board work  
x) Speed of presentation  
xi) Learning experience were given  
xii) Pupil attention was secured  
xiii) Communication skills  
xiv) Subject knowledge  
xv) Methods of teaching
xvi) Use of Aids. 

xvii) Correlation 

xviii) Repetition of facts and concepts 

xix) Elicitation 

xx) Use of Scientific Vocabulary 

xxi) Interaction with Pupil. 

**Dimension (3) Closing:** 

Here the teacher established a link between the present learning with future learning. This requires reflective thinking. The teacher leads the pupils to think systematically, draw conclusion and generalizations. The teacher creates a sense of achievement in pupils. To achieve this, the following aspects are included: 

i) Ending 

ii) Summarization 

iii) Assignment 

iv) Generalization 

**Dimension (4) Evaluation:** 

Evaluation is concerned with the task of finding out the progress and outcome of the teaching process. It is done in order to test the diagnostic and prescriptive functions of teaching. Evaluation serves as a feedback. The aspects involved in evaluation are: 

i) Procedures of evaluation 

ii) Questions asked 

iii) Distributions of questions 

iv) Evaluation is used to recognize pupil’s different changes.
**Dimension (5) Managerial:**

Here the role of a teacher is to manage the class effectively. Management of classroom involves following aspects:

i) Teacher recognize the pupil  

ii) Classroom climate  

iii) Teacher behaviour towards pupil  

iv) Classroom discipline was maintained by  

v) Pacing the lesson.

**Preparation of the Draft tool:**

The tool consisted of five major dimensions namely planning, presentation, closing, evaluation and managerial. Dimensions as well as number of items to be rated with 0-5

<table>
<thead>
<tr>
<th>No</th>
<th>Dimensions</th>
<th>Number of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Planning</td>
<td>8</td>
</tr>
<tr>
<td>2.</td>
<td>Presentation</td>
<td>21</td>
</tr>
<tr>
<td>3.</td>
<td>Closing</td>
<td>4</td>
</tr>
<tr>
<td>4.</td>
<td>Evaluation</td>
<td>4</td>
</tr>
<tr>
<td>5.</td>
<td>Managerial</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>42</td>
</tr>
</tbody>
</table>

N.B: A copy of the final draft tool is given in the Appendix C1.
Scoring Procedure:

The sum of the ratings against all the 42 items constitutes the score of teacher competency scale (TCS Score) of the teacher being observed. So the scoring is done by adding the ratings on the Teaching Competency Scale against all the items given by the investigator after observation of the teaching process.

The range of scores for teaching competency with relation to each dimension is given in table 3.03.

Table 3.03

<table>
<thead>
<tr>
<th>No</th>
<th>Dimensions</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Planning</td>
<td>200</td>
</tr>
<tr>
<td>2</td>
<td>Presentation</td>
<td>525</td>
</tr>
<tr>
<td>3</td>
<td>Closing</td>
<td>100</td>
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<tr>
<td>4</td>
<td>Evaluation</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>Managerial</td>
<td>125</td>
</tr>
</tbody>
</table>

Pilot study:

The investigator visited different schools in 3 educational districts namely Nagercoil, Thuckalay and Kuzhthurai. The sample for the pilot study was 25. The different categories include three educational districts, physics and chemistry subjects, govt and private schools, rural and urban areas, male and female teachers, more experienced and less experienced teachers. So the sample was considered as well distributed one. The investigator personally observed all the classes of the teachers selected for 45 minutes. Total scores of the individual teachers were recorded by the investigator.
Establishing Validity:

Validity is that quality of a data-gathering instrument or procedure that enables it to measure what it is supposed to measure.

Content Validity:

The draft tool was given to experienced science teacher educators for their comments and suggestions. A few items were reformulated and refined on the basis of suggestions given by them. The tool was also given to the Research supervisor, Dr. A. Amalraj, Reader, St. Xavier's college of Education, Palayamkottai for his comments. Some modifications were done in the statements on the basis of his comments. Thus the content validity of the tool was established.

Item Validity:

The draft tool was administered to 25 physical science teachers working in higher secondary schools of Kanyakumari Revenue District. For refinement of the tool item validity was calculated. This is also known as internal validity of an instrument. It refers to the interconnectedness of different items in the same tool. According to Borg and Gall (1979), item reliability and item validity play a vital role in selecting items to form the final tool (P.235)\(^5\). The Teaching Competency Scale has 5 dimensions. Each dimension consists of number of items. The sum of each dimension is calculated under each dimension; \(\gamma\) value is calculated by correlating the individual item score and the corresponding component score. The values are tabulated. “The correlation Coefficient at 5\% level of significance when the degree of freedom is 23” (Aggarwal, 1990, P.236)\(^6\). So the item value 0.396 and above are taken as good items. Validated tool (Appendix C2)
### "γ" value for items in the Draft tool:

<table>
<thead>
<tr>
<th>Item no</th>
<th>&quot;γ&quot; Value</th>
<th>Item no</th>
<th>&quot;γ&quot; Value</th>
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<tbody>
<tr>
<td>1*</td>
<td>0.6211</td>
<td>22*</td>
<td>0.6801</td>
</tr>
<tr>
<td>2*</td>
<td>0.7352</td>
<td>23*</td>
<td>0.5551</td>
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<tr>
<td>3*</td>
<td>0.4892</td>
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<td>25</td>
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<td>7*</td>
<td>0.8213</td>
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<td>0.3172</td>
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<td>0.5102</td>
</tr>
<tr>
<td>18*</td>
<td>0.4000</td>
<td>39*</td>
<td>0.8781</td>
</tr>
<tr>
<td>19*</td>
<td>0.5522</td>
<td>40*</td>
<td>0.4809</td>
</tr>
<tr>
<td>20*</td>
<td>0.4642</td>
<td>41*</td>
<td>0.5678</td>
</tr>
<tr>
<td>21</td>
<td>0.1701</td>
<td>42*</td>
<td>0.6282</td>
</tr>
</tbody>
</table>

* - Marked retained
Establishing Reliability

The investigator observed the classes of 25 physical science teachers. After an interval of 7 days the investigator again observed the classes of the same teachers. The observation of both the occasions were almost identical.

PART-B

METHODOLOGY

INTRODUCTION

According to Hinderson and Lanler (1973) “Teaching is manipulating the variables of instruction to produce intended changes in learners behaviour. (P.73)\(^7\). Teaching process is determined by knowledge, a set of abilities, attitudes and skills (prestagee variables) which in turn determine pupil outcomes. Thus the term ‘teaching’ can be defined as a set of observable teacher behaviours that facilitate or bring about pupil learning and ‘teaching competency’ means an effective performance of all the observable teacher behaviours that bring about desired pupil outcomes. Hence the investigator intended to observe (assess) the teaching competency and its relation with personality and job satisfaction.

Statement of the topic

Personality, Job satisfaction and Teaching Competency- A Study on Higher Secondary Physical Science Teachers.
Definitions of key terms

Personality

According to Allport (1961) “Personality is a dynamic Organisation within the individual of those psycho-physical systems that determine his unique adjustment with his environment” (P 28).8

Job Satisfaction

According to Locke (1969) “Job Satisfaction is a pleasurable or positive emotional state resulting from the appraisal of ones job or job experiences” (P 1300).9

Teaching Competency

According to Biddle B.J and Allena W.J (1964, P 352)10 Teaching competency is one or more abilities of a teacher to produce agreed upon educational effects.

Higher Secondary Physical Science Teachers

Teachers who teach physics and chemistry subjects at higher secondary level.

3.2 OBJECTIVES

SECTION I

1. To study the level of personality characteristics and its dimensions of higher secondary physical science teachers in Kanyakumari Revenue District.
   a) To study the level of personality characteristics- achievement- of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables.
   b) To study the level of personality characteristics- deference- of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables.
c) To study the level of personality characteristics- order- of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables.
d) To study the level of personality characteristics- exhibition- of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables.
e) To study the level of personality characteristics- autonomy- of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables.
f) To study the level of personality characteristics- affiliation- of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables.
g) To study the level of personality characteristics- intraception- of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables.
h) To study the level of personality characteristics- succorance- of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables.
i) To study the level of personality characteristics- dominance- of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables.
j) To study the level of personality characteristics- abasement- of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables.
k) To study the level of personality characteristics- nurturance- of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables.
l) To study the level of personality characteristics- change- of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables.
m) To study the level of personality characteristics- endurance- of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables.
n) To study the level of personality characteristics- **heterosexuality**- of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables.

o) To study the level of personality characteristics- **aggression**- of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables.

2. To study the level of job satisfaction of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables.

3. To study the level of teaching competency and its dimensions of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables.

3(a) To study the level of teaching competency dimension – **planning**- of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables.

3(b) To study the level of teaching competency dimension – **presentation**- of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables.

3(c) To study the level of teaching competency dimension – **closing**- of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables.

3(d) To study the level of teaching competency dimension – **evaluation**- of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables.

3(e) To study the level of teaching competency dimension – **managerial**- of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables.

**SECTION II**

4. To find the significant difference in the personality characteristics and its dimensions of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables such as sex, type of institution, locality, subject taught, qualification, teaching experience, marital status and employment status of the spouse.

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5. To find the significant difference in the job satisfaction of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables such as sex, type of institution, locality, subject taught, qualification, teaching experience, marital status and employment status of the spouse.

6. To find the significant difference in the teaching competency and its dimensions of higher secondary physical science teachers in Kanyakumari Revenue District with reference to background variables such as sex, type of institution, locality, subject taught, qualification, teaching experience, marital status and employment status of the spouse.

SECTION III

7. To find the significant difference among the teachers working in different educational districts, nature of school and designation of teachers in terms of different dimensions of their personality characteristics.

8. To find the significant difference among the teachers working in different educational districts, nature of school, designation of teachers in terms of their job satisfaction.

9. To find the significant difference among the teachers working in different educational districts, nature of school, designation of teachers in terms of their teaching competency and its dimensions.

SECTION IV

10. To find the significant association between different age levels and different levels of personality dimensions of higher secondary physical science teachers.

11. To find the significant association between different qualifications and different levels of personality dimensions of higher secondary physical science teachers.

12. To find the significant association between different years of experience and different levels of personality dimensions of higher secondary physical science teachers.
13. To find the significant association between numbers of in-service training attended and different levels of personality dimensions of higher secondary physical science teachers.

14. To find the significant association between different age levels and different levels of job satisfaction of higher secondary physical science teachers.

15. To find the significant association between different qualifications and different levels of job satisfaction of higher secondary physical science teachers.

16. To find the significant association between years of experience and different levels of job satisfaction of higher secondary physical science teachers.

17. To find the significant association between numbers of in-service training attended and different levels of job satisfaction of higher secondary physical science teachers.

18. To find the significant association between different age levels and teaching competency and its dimensions of higher secondary physical science teachers.

19. To find the significant association between different qualifications and different levels of teaching competency and its dimensions of higher secondary physical science teachers.

20. To find the significant association between years of experience and different levels of teaching competency and its dimensions of higher secondary physical science teachers.

21. To find the significant association between numbers of in-service training attended and different levels of teaching competency and its dimensions of higher secondary physical science teachers.

SECTION V

22. To find the significant correlation between the dimensions of Personality characteristics and teaching competency and its dimensions of teachers with reference to sex, type of institution, locality, subjects taught, age, qualification, marital status, employment status of the partner, educational district, nature of school, experience, designation, in-service attended.

23. To find the significant correlation between job satisfaction and teaching competency and its dimensions of teachers with reference to sex, type of institution, locality, subject to taught, age, qualification, marital status,
employment status of the partner, educational district, nature of school, experience, designation, in-service attended.

3.3 HYPOTHESES

SECTION I

1. The level of personality characteristics- **achievement**- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables is average.

2. The level of personality characteristics- **deference**- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables is average.

3. The level of personality characteristics- **order**- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables is average.

4. The level of personality characteristics- **exhibition**- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables is average.

5. The level of personality characteristics- **autonomy**- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables is average.

6. The level of personality characteristics- **affiliation**- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables is average.

7. The level of personality characteristics- **intraception**- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables is average.

8. The level of personality characteristics- **succorance**- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables is average.

9. The level of personality characteristics- **dominance**- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables is average.
10. The level of personality characteristics- abasement- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables is average.

11. The level of personality characteristics- nurturance- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables is average.

12. The level of personality characteristics- change- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables is average.

13. The level of personality characteristics- endurance- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables is average.

14. The level of personality characteristics- heterosexuality- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables is average.

15. The level of personality characteristics- aggression- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables is average.

16. The level of job satisfaction of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables is average.

17. The level of teaching competency and its dimensions of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables is average.

18. The level of teaching competency dimension - planning- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables is average.

19. The level of teaching competency dimension - presentation- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables is average.

20. The level of teaching competency dimension - closing- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables is average.
21. The level of teaching competency – **evaluation**- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables is average.

22. The level of teaching competency dimension – **managerial**- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables is average.

**SECTION II**

23. There is no significant difference in personality characteristics- **achievement**- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables.

24. There is no significant difference in personality characteristics- **deference**- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables.

25. There is no significant difference in personality characteristics- **order**- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables.

26. There is no significant difference in personality characteristics- **exhibition**- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables.

27. There is no significant difference in personality characteristics- **autonomy**- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables.

28. There is no significant difference in personality characteristics- **affiliation**- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables.

29. There is no significant difference in personality characteristics- **intraception**- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables.

30. There is no significant difference in personality characteristics- **succorance**- of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables.
31. There is no significant difference in personality characteristics- dominance of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables.

32. There is no significant difference in personality characteristics- abasement of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables.

33. There is no significant difference in personality characteristics- nurturance of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables.

34. There is no significant difference in personality characteristics- change of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables.

35. There is no significant difference in personality characteristics- endurance of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables.

36. There is no significant difference in personality characteristics- heterosexuality of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables.

37. There is no significant difference in personality characteristics- aggression of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables.

38. There is no significant difference in job satisfaction of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables.

39. There is no significant difference in teaching competency and its dimensions of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables.

40. There is no significant difference in teaching competency dimension – planning of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables.

41. There is no significant difference in teaching competency dimension – presentation of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables.
42. There is no significant difference in teaching competency dimension—closing—of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables.

43. There is no significant difference in teaching competency dimension—evaluation—of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables.

44. There is no significant difference in teaching competency dimension—managerial—of higher secondary physical science teachers in Kanyakumari revenue district with reference to background variables.

SECTION III

45 There is no significant difference among physical science teachers working in different educational districts with reference to their personality characteristics.

46 There is no significant difference among physical science teachers working in different types of school with reference to their personality characteristics.

47 There is no significant difference among physical science teachers working in different designations with reference to their personality characteristics.

48 There is no significant difference among physical science teachers working in different educational districts with reference to their job satisfaction.

49 There is no significant difference among physical science teachers working in different types of school with reference to their job satisfaction.

50 There is no significant difference among physical science teachers working in different designations with reference to their job satisfaction.

51 There is no significant difference among physical science teachers working in different educational districts with reference to their teaching competency and its dimensions.

52 There is no significant difference among physical science teachers working in different types of school with reference to their teaching competency and its dimensions.

53 There is no significant difference among physical science teachers working in different designations with reference to their teaching competency and its dimensions.
There is no significant association between different age levels of physical science teachers and different levels of their personality dimensions.

There is no significant association between different qualifications of physical science teachers and different levels of their personality dimensions.

There is no significant association between different years of experience of physical science teachers and different levels of their personality dimensions.

There is no significant association between different in-service training attended of physical science teachers and different levels of their personality dimensions.

There is no significant association between different age levels of physical science teachers and different levels of their job satisfaction.

There is no significant association between different qualifications of physical science teachers and different levels of their job satisfaction.

There is no significant association between different years of experience of physical science teachers and different levels of their job satisfaction.

There is no significant association between in-service training attended of physical science teachers and different levels of their job satisfaction.

There is no significant association between different age levels of physical science teachers and their teaching competency and its dimensions.

There is no significant association between different qualifications of physical science teachers and their teaching competency and its dimensions.

There is no significant association between different years of experience of physical science teachers and their teaching competency and its dimensions.

There is no significant association between in-service training attended of physical science teachers and their teaching competency and its dimensions.
SECTION V

66 There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to male.

67 There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to female.

68 There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to govt institutions.

69 There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to private institutions.

70 There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to rural schools.

71 There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to urban schools.

72 There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to the subject physics.

73 There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to the subject chemistry.

74 There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to age group (25-35).
There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to age group (36-50).

There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to age group (51-58).

There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to qualification (M.Sc.B.Ed).

There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to qualification (M.Sc.M.Ed).

There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to qualification (M.Sc.M.Ed.M.Phil).

There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to marital status (married).

There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to marital status (single).

There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to employment of the spouse (teaching).

There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to employment status of the spouse (others).

There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to educational district (Nagercoil).
There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to educational district (Thuckalay).

There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to educational district (Kuzhithurai).

There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to nature of the school (boys).

There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to nature of the school (girls).

There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to nature of the school (co.ed).

There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to teaching experience (upto 10 yrs).

There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to teaching experience (between 11-20 yrs).

There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to teaching experience (above 20 yrs).

There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to designation (probation).

There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to designation (selection grade).
There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to designation (super grade).

There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to in-service training attended (nil).

There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to in-service training attended (once).

There is no significant correlation between the dimensions of personality characteristics of physical science teachers and their teaching competency and its dimensions with reference to in-service training attended (more than once).

There is no significant correlation between the job satisfaction of physical science teachers and their teaching competency.

1. There is no significant correlation between the job satisfaction of physical science teachers and their teaching competency and its dimensions with reference to male.

2. There is no significant correlation between job satisfaction of physical science teachers and their teaching competency and its dimensions with reference to female.

1.1 There is no significant correlation between job satisfaction of physical science teachers and their teaching competency and its dimensions with reference to govt institutions.

2.2 There is no significant correlation between job satisfaction of physical science teachers and their teaching competency and its dimensions with reference to private institutions.

1.1 There is no significant correlation between job satisfaction of physical science teachers and their teaching competency and its dimensions with reference to rural schools.

2.2 There is no significant correlation between job satisfaction of physical science teachers and their teaching competency and its dimensions with reference to urban schools.
100.4.1 There is no significant correlation between job satisfaction of physical science teachers and their teaching competency and its dimensions with reference to the subject physics.

100.4.2 There is no significant correlation between job satisfaction of physical science teachers and their teaching competency and its dimensions with reference to the subject chemistry.

100.5.1 There is no significant correlation between job satisfaction of physical science teachers and their teaching competency and its dimensions with reference to age group (25-35).

100.5.2 There is no significant correlation between job satisfaction of physical science teachers and their teaching competency and its dimensions with reference to age group (36-50).

100.5.3 There is no significant correlation between job satisfaction of physical science teachers and their teaching competency and its dimensions with reference to age group (51-58).

100.6.1 There is no significant correlation between job satisfaction of physical science teachers and their teaching competency and its dimensions with reference to qualification (M.Sc.B.Ed).

100.6.2 There is no significant correlation between job satisfaction of physical science teachers and their teaching competency and its dimensions with reference to qualification (M.Sc.M.Ed).

100.6.3 There is no significant correlation between job satisfaction of physical science teachers and their teaching competency and its dimensions with reference to qualification (M.Sc.M.Ed.M.Phil).

100.7.1 There is no significant correlation between job satisfaction of physical science teachers and their teaching competency and its dimensions with reference to marital status (married).

100.7.2 There is no significant correlation between job satisfaction of physical science teachers and their teaching competency and its dimensions with reference to marital status (single).
There is no significant correlation between job satisfaction of physical science teachers and their teaching competency and its dimensions with reference to employment of the spouse (teaching).

There is no significant correlation between job satisfaction of physical science teachers and their teaching competency and its dimensions with reference to employment status of the spouse (others).

There is no significant correlation between job satisfaction of physical science teachers and their teaching competency and its dimensions with reference to educational district (Nagercoil).

There is no significant correlation between job satisfaction of physical science teachers and their teaching competency and its dimensions with reference to educational district (Thuckalay).

There is no significant correlation between job satisfaction of physical science teachers and their teaching competency and its dimensions with reference to educational district (Kuzhithurai).
Method adopted

This study was carried out in the schools of Kanyakumari revenue district. 120 higher secondary schools were included in the study. The method followed for the investigation was the survey method and stratified random sampling technique was used. The teaching competency scale (TCS) the most significant tool related to this study was validated by the investigator. The other tools namely EPPS and Job Satisfaction Scale were also used.

3.4 POPULATION

The population for the investigation was the physical science teachers handling physics and chemistry subjects at higher secondary school level in Kanyakumari District in Tamilnadu.

3.5 SAMPLE

The investigator observed the classes of physics and chemistry post graduate teachers of government and private higher secondary schools in Kanyakumari district. A total of 320 cases (teachers) formed the sample(Table.3.04).
Table 3.04

Distribution of the sample in terms of the background variables

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Background Variables</th>
<th>Category</th>
<th>No of Teachers</th>
<th>%</th>
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<td>Sex</td>
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<td></td>
<td>Female</td>
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<td>Urban</td>
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<td>23.1</td>
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<td>50.3</td>
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<td></td>
<td>Chemistry</td>
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<td>49.7</td>
</tr>
<tr>
<td>5</td>
<td>Age</td>
<td>25-35</td>
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<td>28.7</td>
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<td>M.Sc M.Ed</td>
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<td></td>
<td>Single</td>
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<td>10</td>
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<td>8</td>
<td>Employment status of the spouse</td>
<td>Teaching</td>
<td>159</td>
<td>49.7</td>
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<td>Others</td>
<td>161</td>
<td>50.3</td>
</tr>
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<td>9</td>
<td>Educational district</td>
<td>Nagercoil</td>
<td>88</td>
<td>27.5</td>
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<td></td>
<td>Thuckalay</td>
<td>118</td>
<td>36.9</td>
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<td></td>
<td>Kuzhithurai</td>
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<td>35.6</td>
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<td>10</td>
<td>Nature of the school</td>
<td>Boys</td>
<td>35</td>
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<td>Girls</td>
<td>62</td>
<td>19.4</td>
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<td>Co-ed</td>
<td>223</td>
<td>69.7</td>
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<td>11</td>
<td>Experience</td>
<td>Upto 10yrs</td>
<td>116</td>
<td>36.3</td>
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<td>11-20yrs</td>
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<td>21 and above</td>
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<td>Designation</td>
<td>Probation</td>
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<tr>
<td></td>
<td></td>
<td>Super grade</td>
<td>63</td>
<td>19.7</td>
</tr>
<tr>
<td>13</td>
<td>In-service Attended</td>
<td>Nil</td>
<td>115</td>
<td>35.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>136</td>
<td>42.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>More than one</td>
<td>69</td>
<td>21.6</td>
</tr>
</tbody>
</table>
Distribution of samples in terms of background variables

- Sex Male
- Type of institution Govt
- Locality Rural
- Subject taught Physics
- Age 25-35
- Age 51-58
- Qualification M.Sc M.Ed
- Marital status Married
- Employment status of the spouse Teaching
- Educational district Nagercoil
- Educational district Kuzhithurai
- Nature of the school Girls
- Experience Upto 10yrs
- Experience 21 and above
- Designation Selection grade
- In-service Attended Nil
- In-service Attended More than one

- Sex Female
- Type of institution Private
- Locality Urban
- Subject taught Chemistry
- Age 36-50
- Qualification M.Sc B.Ed
- Qualification M.Sc M.Ed M.phil
- Marital status Single
- Employment status of the spouse Others
- Educational district Thuckalay
- Nature of the school Boys
- Nature of the school Co-ed
- Experience 11-20yrs
- Designation Probation
- Designation Super grade
- In-service Attended 1
Tools used

The investigator used the following research tools for the data collection

<table>
<thead>
<tr>
<th>S.No</th>
<th>Research tools</th>
<th>Validated by</th>
<th>Factors assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Personality Schedule</td>
<td>Aileen L. Edwards</td>
<td>Personality and 15 traits</td>
</tr>
<tr>
<td>2.</td>
<td>Job Satisfaction</td>
<td>X.L. Saxeena</td>
<td>Job Satisfaction</td>
</tr>
<tr>
<td>3.</td>
<td>Teaching Competency</td>
<td>Investigator and Dr. A. Amalraj</td>
<td>Teaching Competency</td>
</tr>
</tbody>
</table>

Administration of the tool and collection of data

In order to administer the chosen tools to the physical science teachers the investigator contacted the heads of the higher secondary schools and obtained permission from them. The investigator visited the schools personally, gave a brief introduction about the purpose of visit and observed the classes of the physics and chemistry postgraduate teachers for a duration of 45 minutes and collected data for teaching competency. The other two tools EPPS and job satisfaction were filled by the higher secondary physical science teachers. No time limit was given for responding the questionnaire. With a demographic schedule, personal information of the teachers was also collected.

After collecting the filled in research tools, the responses were carefully scored and tabulated for statistical analysis.

N.B: Demographic schedule is given in Appendix

List of the higher secondary schools is given in Appendix D.
3.6 STATISTICS USED

't' test

Sir William Gusset contributed a lot to the theory of small samples. Gusset published his discovery in 1905 under a pin name 'student' and it is popularly known as 't' test. It is used to find out the significant difference between the means of two variables.

\[ t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}} \]

Where,

- \( M_1 \) = Mean of the first group
- \( M_2 \) = Mean of the second group
- \( \sigma_1 \) = Standard deviation of the first group
- \( \sigma_2 \) = Standard deviation of the second group
- \( N_1 \) = Number of cases in first group
- \( N_2 \) = Number of cases in second group

ANOVA test

Analysis of variance has been used to find out the difference among the variables.

\[ F = \frac{\text{Mean square variance between groups}}{\text{Mean square variance within groups}} \]

CHI-Square test

The chi-square analysis is employed to test the association between the variables.
\[ \chi^2 = \sum \frac{(O - E)^2}{E} \]

Where,

- \( \Sigma \) = sum of
- \( \chi^2 \) = Chi-square
- \( O \) = Observed frequency
- \( E \) = Expected frequency

Karl Pearson’s Product Moment Correlation

Karl Pearson’s product moment correlation is used to determine the relationship between two variables.

\[ \gamma = \frac{N\sum xy - (\sum x)(\sum y)}{\sqrt{N\sum x^2 - (\sum x)^2} \sqrt{N\sum y^2 - (\sum y)^2}} \]

Where,

- \( N \) = Total number of pairs
- \( X \) = Raw scores
- \( Y \) = Raw scores
- \( \gamma \) = Karl Pearson’s product moment correlation coefficient

3.7 LIMITATIONS

1. Present research work is limited to physical science teachers working in government and private schools in Kanyakumari revenue district. Matriculation schools are not included.

2. Some more background variables can be included in study like religion and community, income and family size.
<table>
<thead>
<tr>
<th></th>
<th>Title</th>
<th>Author(s)</th>
<th>Publication Year</th>
<th>Source and Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>College Teacher Competency- A Research Report</td>
<td>Sathiagirirajan .S.</td>
<td>1994</td>
<td>Publications Division, Madurai Kamaraj University (P.150-156)</td>
</tr>
<tr>
<td>9</td>
<td>Handbook of Industrial and Organizational Psychology.</td>
<td>Locke .E.A.</td>
<td>1969</td>
<td>Handbook of Industrial and Organizational Psychology. Chicago Rant (P.1300)</td>
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