CHAPTER IV

METHODOLOGY

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CHAPTER IV

METHODOLOGY

4.1. Methodology: A Precept

In a typical research study, researchers begin by identifying the important research problems and research questions that they want to address. Then they select the most appropriate research method or methods that will help them decide on a research design and a research strategy that will allow them to answer their research questions. Researchers next decide how they are going to collect their empirical research data (Johnson & Christensen, 2008).

Research methodology is the way to systematically solve the research problem. It includes programme planning, method developed, implementation, data collection, analysis, report and conclusion related to a particular discipline or field of inquiry. A good draft of the research methodology is the key elements of the process of research writing and reflect introduction, purpose for the study, identify research questions and hypotheses, advance methods and procedures. Research methodology also considers size of sampling, measures, design, tools and materials, variables as well as the theories of validity and reliability behind each step.

4.2 Methodological Exploration

Since the study was intended for developing certain strategies for better teacher accountability and reflective teaching among secondary school
teachers in Kerala, the investigator adopted the survey cum experimental method or mixed approach for the study. To find out teacher accountability and reflective teaching the investigator adopted survey method for collecting data from the different districts of Kerala and for developing certain strategies for better teacher accountability, the researcher has adopted experimental method.

Here the investigator used qualitative and quantitative methods for collection of data. The quantitative methodologies test theory deductively from existing knowledge, through developing hypothesized relationships and proposed outcomes for study. Qualitative approach is guided by certain ideas, perspectives or hunches regarding the subject to be investigated. The aim of qualitative research is to describe certain aspects of a phenomenon, with a view to explain the subject of study. In quantitative research, the investigator maintains a detached, objective view in order to understand the facts (Duffy, 2011).

4.3. Phases inception of the investigation

The investigator provided some phases for incepting the research in different forms of data collection. The methods adopted for the study are described under the following phases.
(a) **Phase I- Develop and implementation of inventories.**

In this phase, the investigator developed two scales to find out the teacher accountability and reflective teaching among secondary school teachers. The Teacher Accountability Analysis was intended to make teachers aware of their accountability to the teaching profession. This type of accountability must focus on individual responsiveness and interpersonal dynamics within specific contexts. It emphasizes information on feedback and continuous improvement of the teacher. Teachers are committed to providing quality programmes and welcome accountability strategies that are effective, fairly implemented, and can achieve meaningful results.

To find out the extent of teacher accountability and reflective teaching, the investigator has prepared and developed the Teacher Accountability Analysis Scale (TAAS) and Reflective Teaching Analysis Scale (RTAS) prepared and standardized by the investigator with the assisting of research supervision.

The phased implementations of the investigation are explained below.
Figure 4.1: Procedure for development and implementation of Scale

The figure 4.1 shows the investigator’s procedure and steps for development and implementation of each scale namely Teacher Accountability Analysis Scale (TAAS) and Reflective Teaching Analysis Scale (RTAS). It is clear from the figure, how the investigator selected the strategies for enhancing teacher accountability and reflective teaching.

(b) Phase II – Selection and Implementation of Selected Strategies

In the second phase, the investigator tried to find out suitable strategies for enhancing teacher accountability and reflective teaching among secondary school teachers. In the first phase, the investigator
developed inventories to find out the extent of teacher accountability and reflective teaching and determined the weaker dimensions of each scale. The investigator selected certain strategies for better teacher accountability and reflective teaching among secondary school teachers. Through effective teaching, the teacher can increase the teacher accountability and reflective teaching. Effectiveness of teaching depends on the learner’s prior knowledge and the learner’s active cognitive processing. It includes teaching students how to learn, how to remember, how to think and how to motivate themselves (Weinstein and Mayer, 2008). The goal of any learning strategy may affect the learner’s motivational or affective state, or the way in which the learner selects, acquires, organizes or integrates new knowledge were taken into consideration while developing the scale. Here the investigator selected two strategies for enhancing teacher accountability among secondary school teachers, namely, Substitute, Combines, Adapt, Modify, Put to other uses, Eliminate and Rearrange (SCAMPER) Technique and Strength, Weaknesses, Opportunities and Threats (SWOT) Analysis. For enhancing reflective teaching capacities, the investigator selected Brain Based Learning and Mind Mapping Learning strategies and implemented each strategy among high school teachers. Phase II is the part of experimental study; so it followed by pre-test post-test non equivalent group design. Phase II is illustrated below
The phase II indicates the experimental study or quantitative study conducted by the investigator. These strategies are applied among secondary school students by the secondary school teachers, with the assistance of select secondary teachers along with investigator. The investigator conducted pre-test and post-test treatment on each experimental and control groups. This is done with a view of obtaining a comprehensive vision of the phased implementation.
(c) Phase III- Development and Implementation of Participant Observation Schedule (POS)

This phase explains the implementation of developed participant observation schedule. To find out the effectiveness of the select strategies, the investigator prepared structured participant observation schedule on SCAMPER technique, SWOT Analysis, Brain Based Learning and Mind Mapping Technique. The steps, procedures and components of each strategy are different. So the investigator developed the observation schedule based on each components of the strategy. After preparation of participant observation schedule, the investigator implemented the observation schedule among secondary school teachers (selected teacher sample). The observation schedule is prepared only for experimental group. At the time of implementation of each strategy, the investigator observed in tune with structured observation Schedule.

![Diagram of SCAMPER, SWOT, BBL, MM](Diagram)

**Figure: 4.3: Development and implementation of the Participant Observation Schedule.**
(d) Phase IV- Development and Implementation of Strategy Evaluation Proforma (SEP)

The investigator developed the strategy evaluation proforma based on SCAMPER technique, SWOT Analysis, Brain Based Learning and Mind Mapping strategies. This strategy evaluation proforma throws light into efficacy of strategy implementation and the challenges faced by the teachers at the time of strategy implementation. At this stage, the investigator felt that these teaching strategies play a significant role in enhancing the teacher’s accountability and reflection. Through the production of new strategy, the teachers were able to improve the quality of teaching and learning process. This also helped students to attain control of their own thinking process, thereby enhancing their aptitude for learning. The main objectives of learning are to provide a systematic practice and interdisciplinary overview of the discipline and to change student behaviour through implementation of new strategies. The fourth phase of the strategy implementation is illustrated below.

![Diagram](Image)

Figure: 4.4: Development and implementation of the Strategy Evaluation proforma
(Sources of Strategy Evaluation proforma from Bolton, Gillie, 2005)

The investigator develops and implements the strategy evaluation proforma among secondary school teachers. The investigator prepared separate strategy evaluation proforma on SCAMPER Technique, SWOT Analysis and Brain Based Learning and Mind Mapping strategies. After implementation of each strategy, the teachers (selected experimental teachers group) filled their strategy evaluation proforma.


Research design is the strategy, the plan, and the structure for conducting a research project. The investigator selected mixed method designs, those that incorporate the components of qualitative and quantitative designs and analyses. The investigator collected data related to teacher accountability and reflective teaching among secondary school teachers from various districts and she has adopted two non-equivalent groups for experimental study. Research design should be based on the research questions. That is concerned with the interrelationships among variables, the predictability of certain outcomes and the comparison of specific groups that are likely to be required for qualitative research designs. A research question that is concerned with processes, unanticipated outcomes and cultural impacts are likely to be required for qualitative approaches when there are multiple research questions investigated in a
study and then the researcher will probably use a combination of quantitative and qualitative techniques. In the present study, combinations of both qualitative and quantitative techniques were employed.

Research designs in quantitative research tend to be structured and prescriptive, much more than in qualitative research. Here, the investigator adopted quantitative and qualitative design. They are explained below.

(a) Quantitative design adopted.

The investigator developed Multiple Group Design with one pre test and one post test design for the Experimental study. The symbolic representation of the experimental study is given below

\[
\begin{array}{ccc}
E_1 & T_1 & X_1 \\
T_2 & T_1 & X_2 \\
E_3 & T_1 & X_3 \\
E_4 & T_1 & X_4 \\
C & T_1 & P_1
\end{array}
\]

Where,

- \( E_1 \) = Experimental group 1
- \( E_2 \) = Experimental group 2
- \( E_3 \) = Experimental group 3
- \( E_4 \) = Experimental group 4
- \( X_1 \) = Treatment of SCAMPER Technique
X2 = Treatment of SWOT Analysis
X3 = Treatment of Brain Based Learning (BBL)
X4 = Treatment of Mind Mapping Learning (MML)
PI = Prevailing Methods of Teaching
C = Control group
T1 = Pre-test
T2 = Post-test

(b) Qualitative design adopted

Research design in qualitative research is used to control or explain variance.

Figure: 4.5: Design adopted for the qualitative study.

Qualitative design is the strategy, the plan, and the structure of conducting a survey research project. The study is an empirical one
primarily based on qualitative aspect of research. Therefore correlated study design has been adopted for the survey.

4.5. Participants of the study

The investigator selected the sample for qualitative and quantitative study. For the survey study, the investigator collected data from secondary school teachers in Kerala, using stratified sampling technique. The sample comprised 500 teachers from Kannur, Kasargod, Kozhikode, Kottayam and Ernakulam districts. The list of the survey study is given in Appendix I.

![Figure 4.6: Distribution of the total sample for survey](image-url)
For the experiment, the investigator selected a sample of 50 (experimental and control group) secondary school teachers on the basis of prior survey and 1500 (experimental and control group) secondary school students from different districts of Kerala; Kannur, Kasargod, Kozhikode, Kottayam and Ernakulam. The list of the school selected for quantitative study is given in Appendix II. The breakup of the sample is given below.

Figure 4.7. Break up of the sample for Experimental study
4.6. Variables Enacted for the Study

Variables are anything that might have impact or the outcome of the study. The investigator selects independent and dependent variables according to the needs of the study.

In an experimental study, the investigator manipulates independent variables and dependent variables. In the present study, the independent, the dependent and the control variables play a significant role. The details of the variables are explained below.

(a). Independent variables.

The independent variable, also referred to as the experimental variable, the cause or the treatment is that activity or characteristic believed to make a difference. In educational research, independent variables typically manipulated include method of instruction, type and frequency of reinforcement, arrangement of learning environment, type of learning materials and size of learning group. An independent variable is a hypothesized cause or influence on a dependent variable. In this study, the investigator selected SCAMPER Technique, SWOT Analysis, Brain Based Learning Mind Mapping as an independent variables.

(b). Dependent variables.

The dependent variable also referred to as the criterion variable, affect post -test, is the outcomes of the study, the change or difference in
groups that occurs as a result of manipulations of the independent variable. It is referred to as the dependent variable. It is dependent on the independent variable. The dependent variable may be measured by a test, but not necessarily or the only restriction on the dependent variable is that it represents an outcome that is measurable. Here Performance in Social Science to selected strategies is the dependent variable.

![Variables Diagram]

**Figure 4.8: Variables of the Experimental study**

### 4.7. Analytical Support and techniques used for data Collection

Tools and materials refer to the devices or instruments to collect data required for the study of the Performance of pupils or selected samples in a particular area. In this study, the investigator developed several tools for experiment and survey study. This tool is used for gathering data as per
the objectives and hypotheses set for the study. The details of each tool and materials are given below.

**Material and Tools used for the study**

1. **Prepared and Standardized Scales**
   (Sumamol N. S; & Prof. (Dr). A. Sudharma, 2008)
   - Teacher Accountability Analysis Scale (TAAS).
   - Reflective Teaching Analysis Scale (RTAS).

2. **Lesson Designs based on Select Strategies**
   (Sumamol N. S; & Prof. (Dr). A. Sudharma, 2008)
   - Lesson Designs based on SWOT Analysis
   - Lesson Designs based on SCAMPER Technique.
   - Lesson Designs based on Brain Based Learning
   - Lesson Designs based on Mind Mapping.
   - Lesson Designs based on Prevailing Activity Oriented Approach
     (Sumamol N.S; & Prof. (Dr). A. Sudharma, 2008)

3. **Pre-Test and Post –Test.**
   (Sumamol N.S; & Prof .( Dr). A .Sudharma,2008)

4. **Participant observation schedule based on Select Strategies**
   (Sumamol N. S; &Prof .(Dr ). A. Sudharma, 2008)
   - Participant observation schedule based on SCAMPER Technique.
   - Participant observation schedule based on SWOT Analysis.
   - Participant observation schedule based on Brain Based Learning.
Participant observation schedule based on Mind Mapping

5. Strategy Evaluation Proforma based on selected strategies

(Sumamol N. S; & Prof. (Dr). A. Sudharma, 2008)

- Strategy Evaluation Proforma – SCAMPER Technique
- Strategy Evaluation Proforma – SWOT Analysis
- Strategy Evaluation Proforma – Brain Based Learning
- Strategy Evaluation Proforma – Mind Mapping

4.7.1 Teacher Accountability Analysis Scale (TAAS).

The teacher accountability, there is a need to make the teachers thought with the extent of awareness of their accountability to their stipulated task. Since teacher accountability is very important in modern teaching learning processes, the accountability of the teachers should be evaluated at frequent intervals. The supervisor should see how far the teachers are accountable in respect of teaching, research, co-curricular activities, use of aids and equipments in the classroom, utilization of local resources for the benefit of the students and development of student’s moral and ethical values.

The investigator found out the teacher accountability among secondary school teachers in Kerala. Criterion of the tool is based on the objectives and hypotheses for the study. To prepare the Teacher accountability, the investigator followed some steps as given below:
Step 1. Selection of Dimension

Before preparing the TAAS, the investigator collected the information from different sources like, internet, text books, Journals etc. Based on the collected data, the investigator selected dimension related to the teacher accountability. The dimensions of the teacher accountability are:

(a) Personal Accountability

(b) Professional Accountability

(c) Social Accountability

Step 2. Selecting the specific elements of each dimension

After the selection of the dimension, the investigator tried to find out the important elements related to each dimensions. So the investigator found out the following elements

- **Personal Accountability**

  The statement under this dimension measures the teacher’s personality traits. It includes 6 elements such as Responsibility, respect, Discipline, Punctuality, Co-operation and Self evaluation.

- **Professional Accountability**.

  This dimension includes, 7 elements and each element assesses the professional growth of the teachers. The following elements are included in this dimension. They are teaching effectiveness, professional development, reflective teaching, evaluation, commitment, attitude and Performance.
Social Accountability

Teachers should have the responsibility towards society, community and parents. In this context, the investigator included social accountability dimensions to TAAS. The investigator generally considered social accountability. Social Accountability involves statements to assess the social relationship of the teachers and it includes 4 statements.

Step 3. Selection of Statements

The investigator prepared some statements based on each element coming under each dimension. For this purpose; the investigator included two statements coming under personal accountability. Professional accountability includes seven elements and each element includes two statements. Social accountability involves statements to assess the social relationship of the teachers and it included four statements.

Step 4. Pilot Study

A draft of the scale was prepared. The scale consisted of 80 items spread over the dimensions. The scale was 5 point and developed for the purpose of assessing the extent of teacher accountability. The scale included two parts, part one related to the personal data sheet and statements about the dimensions.

Step 5. Standardization of the Scale

The investigator had held lengthy discussions with the supervising teacher and the experts in the field. Thus the different components that are
to be incorporated under teacher accountability and reflective teaching practices were determined and items were developed accordingly. Each item in the scale was subjected to the procedure contained a Likert type scale, indicating the degree of agreement on a five point continuum.

**Step 6. Final draft**

The final scale included 40 items and the scores obtained in the all the 40 items were pooled together. A respondent can get a maximum of 200 scores on this scale. There are five responses assigned to the statements, viz. ‘always’, ‘often’, ‘sometimes’, ‘rarely’ and ‘never’ under the suitable category according to his or her self evaluation, secondary school teachers have to put a tick mark in the space provided in the scale. For each statement, a score of 5, 4, 3, 2 and 1 was assigned for every positive response ‘always’, ‘often’, ‘sometimes’, ‘rarely’ and ‘never’ respectively. For the negative statements, a score of 1, 2, 3, 4 and 5 were given in the continuum of responses.

**Validity**

The investigator had held long discussions with her supervising teacher and the experts. Thus, the different components that are to be incorporated under teacher accountability were determined and items were developed accordingly. Based on the expert criticism, some of the items were discarded, some items were reworded for teacher accountability among secondary school teachers. Thus the psychometric property of
validity was determined through content/construct/face validity. Draft form of teacher accountability and Reflective teaching scales are given in appendix III. A copy of the teacher accountability analysis scale thus prepared is given in Appendix IV

**Reliability**

The reliability of Teacher Accountability Analysis Scale for high school teachers is assessed through test–retest method. The investigator administered the same scale to 120 teachers after a break of three weeks. The obtained scores were correlated with the scores obtained in the first administration. The co-efficient of correlation obtained was 0.86 thus the scales were found to possess and valid and reliable indices, which reflects the psychometric qualities of the scale for administrative and interpretations.

**4.7.2 Reflective Teaching Analysis Scale (RTAS).**

The investigator found out the reflective teaching among secondary school teachers in Kerala. For the preparation of the tool, the investigator adopted following step.

**1. Selection of Dimension**

The investigator, selected several dimensions related to reflective teaching practices among secondary school teachers. The selected dimensions are listed below
(a) Reflective Teaching
(b) Reflective Thinking
(c) Professional Reflection
(d) Personal Reflection
(e) Social Reflection

2. Fixation of the dimension

After selection of each dimension, the investigator tried to find out the nature of each dimension. According to the nature of each dimension, the investigator arranged each dimension in a sequential order. This arrangement made it possible to have a specific set of dimensions at the beginning of each section of the tool.

3. Standardization of dimension

After fixation of each dimension, the investigator standardized the dimension using test-re test methods.

4. Drafting of scale

The investigator prepared the first draft of the Reflective Teaching Analysis scale. This scale consisted of 68 items and each item having five categories of responses. Each of the statements was meant for measuring particular dimensions. Thus all the statements fall fewer than 5 dimensions and the scale included personal data sheet and statements falling under each dimension with 5 point responses.
3. Try out the norms

Finally the RTAS was edited and the scale consisted of 40 items having 5 categories of responses. Each of the statements was meant for measuring a particular dimension and the items measuring a common characteristic were assigned in a category, thus the statements fall under 5 main categories. Thus the investigator could develop 40 items in the scale which have adequate psychometric preparation.

Validity

The investigator had held long discussions with her supervising teacher and the experts in the field. The different components that are to be incorporated under reflective teaching were determined and items were developed accordingly. Based on the expert criticism, some of the items were discarded, some were reworded for reflective teaching among secondary school teachers. Thus the property of validity was determined through content/construct/face validity.

A copy of the Reflective teaching Analysis scale thus prepared is given in Appendix V.

Reliability

The reliability of Reflective Teaching Analysis Scale for high school teachers were established through test–retest method. The investigator administered the same scale to 120 teachers after a break of three weeks. The obtained scores were correlated with the scores obtained...
at the first administration. The co-efficient of correlation obtained was 0.80. Thus shows a high degree of correlation and the scale was found reliable.

4.7.3. Lesson Design Based on SCAMPER Technique

The investigator decided to conduct the study among high school teachers in Kerala, teaching social science. The investigator selected standard IX pupils. The investigator prepared the lesson designs based on SCAMPER Technique. For this purpose, the investigator selected the unit ‘Factors of Production’ from Social Science. It includes different steps of SCAMPER technique and distributed each lesson designs to high school teachers for conducting the experimental study.

SCAMPER technique is a strategy that can be used to assist students to generate information in the existing knowledge. It is a tool to support creative and divergent thinking. Teachers are decision makers who select from a variety of instructional models and strategies as they plan their lesson. The SCAMPER Technique uses a set of directed questions to which students answer about their profortune (Combinations of Problem and Opportunity) in order to come up with new ideas. SCAMPER is acronyms for substitute, combine, adapt, and modify and put to other uses,
**eliminate, reverse/rearrange.** Figure 4.9 explains the meaning of SCAMPER

![Diagram of SCAMPER technique]

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**Figure: 4.9. Acronym of SCAMPER Technique**

The investigator used one of the strategies for better teacher accountability and prepared lesson designs based on the theoretical overview and review of related literature. For this purpose, the investigator divided each acronym into different stages and two sessions were used. SCAMPER technique lesson designs are explained below.

**Sessions of SCAMPER Technique.**

- **General format** (General format includes name of teacher, name of school, subject, unit, topic, duration of lesson designs of SCAMPER Technique.)

- **SCAMPER goals** (The investigator developed curricular objectives based on the SCAMPER goals)
• **Learning Materials on SCAMPER Technique** (The investigator provided some learning materials for developing each element of SCAMPER Technique)

• **Presentation of SCAMPER Technique** (The investigator provided some simple questions to facilitate interact between instructor and students at the time of presentation and introduced the acronym of SCAMPER Technique)

• **Learning process** (Learning process includes the interaction of instructor with students, components of SCAMPER Technique and learning output on SCAMPER technique)

• **SCAMPER Follow up** (at the end of each lesson included some assignments and follow up activities based on SCAMPER Technique)

**Implementation Session of SCAMPER Technique**

This session includes presentation of the SCAMPER technique and formulation of questions based on each element of SCAMPER Technique. It is divided into several stages. They are explained below.

1. **Presentation stage**

   The instructor introduces the SCAMPER Technique at the preliminary stage. The instructor explains each letter, nature, methods and arrangement of each activity based on the SCAPMER Technique. To increase the curiosity of students, the instructor introduces the strategy in
the form of game and provides some rules to arrange the content based on the SCAMPER questions.

2. Substitute Stage.

After introducing the lesson, the teacher should formulate a set of directed questions to come up with new ideas. Teacher helps the students to think about substituting part of student’s product/process for something else. By looking for something to substitute, students can often come up with new ideas. For example, teacher can provide some typical questions; what can you substitute to make an improvement? What can you substitute the place, time, materials or people?

3. Combine Stage

In this stage, the teacher helps the students think about combining two or more parts of student’s ideas to achieve a different product or process. For this purpose, the teacher frames some typical questions; what materials, features, processes, people, product or components can you combine? How many factors or ideas can combine or provide for better product or process.

4 Adoption Stage

The instructor provides some typical questions to assist students to contribute new ideas or alters. It supports creative, divergent thinking.
Students think about which part of the products/process could be adapted to remove the probortunity or think how they could change the nature of the product or process. The important questions are what part of the product could you change? If exchange for what/what if you were to change the characteristics of a component?

5. Modifying Stage

In the modifying stage, the teacher asks some relevant questions for modifying the students’ process or product. In this stage, the teacher asks what happen your product or process? Is it increases or reduces in a scale or change shape or modifies attributes? Think about changing part or all of the current situation or to distort it in an unusual way.

6. Other uses of product or process Stage

In this section, the teacher formulates creative and thinking questions based on the unit, to find out many purpose of product and process. Think of how they might be able to put their current solution/product/process to other purposes or think of what they could reuse from somewhere else in order to solve their own probortunity(problem & opportunity). Examples of the typical questions are related to the market product, what other market could you use this product in? Who or what else might be able to use it?
7. Elimination stage

In this stage, think of what might happen if you eliminated various parts of the product/process/probortunity and consider what you might do in that situation. This often leads you to consider different ways of tackling the probortunity. Typical question are what would happen if you remove a components.

8. Rearrange /Reverse Stage

Sequences or order or position of the items under review or turn inside, out or upside down and also use of reverses. This stage simplifies the transfer of reverse concepts into new situations, further time and experiences, contributing to learning are provided by this activity. Opportunities for students to express their understanding of the subject and receiving feedback from others who are very close to their own level of understanding are provided by group discussion and co-operative learning situation Students rearrange / reverse their ideas and think in higher order level

9. Evaluation Stage

It is vital for students to use the skill they have acquired and evaluate their understanding. Moreover, feedback should be received on the adequacy of their explanation by the students. At the beginning and through the SCAMPER techniques, sequence, informal evaluation can occur. A

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formal evaluation after rearrange stage is completed by the teacher. Educational outcomes should be assessed on a practical educational manner. In this stage, the teacher manages assessments to discover each student’s level of understanding (Bybee, et al., 2000).

Evaluation and assessment can happen at all stages of the permanent institutional process. This stage helps both the learners and instructors to assess how well the learners understand the SCAMPER concept and whether they have met the learning outcomes. There should be opportunities for self assessment as well as formal assessment. A copy of the lesson design prepared is given in Appendix VI.

4.7.4. Lesson Design based on SWOT Analysis

SWOT Analysis is a commonly used method involving category of both internal and external factors as Strengths, Weaknesses, Opportunities and Threats. The applications of SWOT Analysis follow some steps. The investigator selected standard IX pupils and selected the unit ‘Factor of Production’ from Social Science for teaching SWOT Analysis method. The investigator developed four steps/session for the design of selected strategy. They are explained below.

- **Session 1**: Selection of the topic/unit
- **Session 2**: Create a SWOT template
- **Session 3**: Write the issue to be discussed
- **Session 4**: Complete the operation
Figure: 4.10. Sessions of SWOT Analysis Template

The implementation of SWOT analysis includes two sessions, one session includes general elements of the lesson and the second session included steps of SWOT Analysis.

**Session one General Elements**

Session one includes general format of lesson plan, curricular objectives of SWOT Analysis, materials used for SWOT analysis, introduction, definition of the selected learning concepts, selection of each elements of SWOT Analysis and discussion and decision making. They are explained below.

- **General format** (General format included the name of teacher, name of school, subject, unit, topic, duration of lesson designs of SWOT Analysis.)
- **Curricular Objectives based on SWOT Analysis** (The investigator developed curricular objectives based on the SWOT Analysis)
- **Materials based on SWOT Analysis** (The investigator provided some learning materials for development of each elements of SWOT Analysis)
• **Introduction of SWOT Analysis** (The investigator provided some simple questions to interact between the instructor and students at the time of presentation and introduced the SWOT Analysis)

• **Definition of the Topic and Unit** (The investigator provided some definition related to selected learning unit/topic)

• **Find out Strength, Weaknesses, Opportunities and Threats from the unit.** (The investigator provided some questions to find out the Strength, Weakness, Opportunities and Threats from the unit/lesson)

• **Group Discussion and decision making** (This session included the group discussion related to the learning unit and finally take the decision based on each element.)

**Session Two Implementation of SWOT Analysis**

Session two included the different steps/stages used for the design of SWOT analysis among students. They are explained below.

**Step 1: Selection of the Topic**

The first step of SWOT Analysis is to find out the topic or unit suitable for SWOT Analysis strategy. The nature of the unit should be favourable for SWOT Analysis. This technique helps in decision making. A SWOT Analysis is a subjective assessment of data which is organized by the SWOT format into a logical order that helps understanding, presentation, discussion and decision making. Selection of the topic is very important for SWOT Analysis strat...
Step 2: Creation of SWOT Template

After selecting of the topic, the instructor should prepare a lesson template based on SWOT Analysis and each component should be written on the opposite page. SWOT Analysis is the key component of strategic development. So the instructor should include the internal and external factors of teaching unit or topic.

Strength-Ability, resources,
Weaknesses- Failures, defeats, losses and inability, dynamic situation
Opportunities-Possibilities, future
Threats- Obstacles

Subject of SWOT Analysis: (Define the Subject/topic/unit)

Strengthening factors related to the units/topic

Weaknesses of the related unit/topic

Opportunities related to the unit/topic

Threats related to unit/topic

Figure: 4.11. Format of SWOT Analysis Template
Step 3: Writing of Issues

For completing the second step, the instructor should find out the important issues or problems from the topic/unit. In classroom teaching, students should find out the issues selected for discussion. Group discussion and teacher–student’s styles of interaction develop the SWOT Analysis process. In this step, the instructor provides some thought provoking questions related to the topic. SWOT Analysis is based on some assumptions that can carefully review such Strength, Weaknesses, Opportunities and Threats.

Step 4: Completion of the operation

This is the last part of the SWOT Analysis. The instructor completes the operation with the presentation by the students. In this section, students should find out the internal and external factors of SWOT Analysis related to the unit/topic. Students higher order thinking ability are developed and they find out the inter relationship between each factor from the unit/topic. They conclude the relationship of each term as follows:

S-O Strategies pursue opportunities that are good fit to the strength

W-O Strategies –overcome weaknesses to pursue opportunities

S-T Strategies- identifies ways that the firm can use its strengths to reduce to external threats.
W-T Strategies establish a defensive plan to prevent the firm’s weaknesses from making it highly acceptable external threats.

After completion of each stage, the instructor provides some assignments related to the unit in the form of SWOT Analysis. A copy of the lesson design prepared is given in Appendix VII

4.7.5. Lesson Design Based on Brain Based Learning

The investigator selected for the conduct of the study standard IX pupils and selected the topic “Factors of production” suitable for Brain Based Learning from the Social Science. This study Brain Based Learning strategy developed by the investigator using PROE format. Brain Based Learning relates some skills such as thinking skills, graphic organize collaboration skills and arrangement of materials etc. Design of Brain Based Learning strategy based on PROE format it is explained below.

P- Predict
R- Reason
O- Observation
E- Explain

Lesson planning is divided into a number of phases or elements. Each phase is designed to ensure that lessons are laid out in a logical way that progress smoothly and concludes satisfactorily.

The lesson designs based on Brain Based Learning focuses on six phases of lesson planning.
Lesson phases may be accomplished by using a wide variety of instructional strategies. A skilled teacher selects strategies and improvise with own teaching styles and preferences. But more important is that they select strategies that fit their student’s interests and learning profiles and they change and modify strategies according to their effectiveness.

Each lesson design on Brain Compatible Learning Method consists of the following steps.

- **General Format** (Name of teacher, Name of School, Subject, Unit, Topic, Standard, Division and Duration.)
- **Curricular objectives of the strategy** (The investigator prepared curricular objectives based on each lesson/unit)
- **Teaching materials** (Teaching materials mean the aids of teaching learning process related to the topic/content)
- **Pre-requisites and materials required.** (The instructor should check the previous knowledge of the students about the unit/topic)
- **Learning processes** (Procedure adopted in the teaching learning process)
- **Components** – Predict, Observation, Reason and Explanation
- **Learning Outcomes** (Learning outcomes is the end product of the process.)

The details of the Brain Based Learning strategies designs is cited in table 4:1
## Table 4.1

**Instructional phases of Brain Based Learning Strategy**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Active Phase</strong></td>
<td>Students begin to engage with process of learning, in different ways, the teacher starts to present all phases in a sequential order. Activity- practice knowledge or skill Starting the expectation Providing an interview</td>
</tr>
<tr>
<td><strong>Acquire Phase</strong></td>
<td>Teacher may use the methods Actively learns –where the teacher plans and facilitates the acquisition of information and skills.</td>
</tr>
<tr>
<td><strong>Predictive Phase</strong></td>
<td>Students consolidate new skills and content through practice. This practice and application include a wide variety of strategies and is synonymous how the brain makes meaning and stores information through predictive process.</td>
</tr>
<tr>
<td><strong>Observation phase</strong></td>
<td>Students observe each material and find out the reasons of their predictions. Through careful observation, the learner can classify compare, list out and find out the relationship of each terms and concepts.</td>
</tr>
<tr>
<td><strong>Reasoning Phase</strong></td>
<td>After prediction and observation, the learner provides suitable reasons of prediction and finds out the correct facts from careful observation. The learner can also provide some resources.</td>
</tr>
<tr>
<td><strong>Explanation Phase</strong></td>
<td>The learner can provide, more explanation related to the topic and explains with some attributes. The group and individual explanation should be allowed.</td>
</tr>
<tr>
<td><strong>Evaluation Phase</strong></td>
<td>This phase is related to the effectiveness of the strategy. The teacher evaluates the students’ Proformance of each phase and total class Proformance and weakness of each phases. Assess students learning is the context of teaching</td>
</tr>
</tbody>
</table>

A copy of the lesson design prepared is given in Appendix VIII.
4.7.6. Lesson Design based on Mind Mapping

A mind map is a diagram used to represent words, ideas, task or other items linked to and arranged around a central key word or idea. Mind maps are used to generate, visualize, structure and classify ideas and as an aid to studying and organizing information, solving problems, making decisions etc.

The elements of a given mind map are arranged intuitively according to the importance of the concepts and are classified into groupings, branches or areas with the goal of representing semantic or other connections between portions of information. Mind maps help recall stored information. The investigator selected standard IX pupils and selected the unit ‘Factor of Production’ from Social Science for teaching Mind Mapping Strategy.

Steps in developing a Mind Map

For the preparation of Mind mapping lesson design, the investigator follows some steps. They are

Step 1. Begins with words/image

Mind Mapping begins with a word or image placed in the middle of the page, which symbolizes what

Step 2 –Lighten Up

Start with an open, creative attitude. Let’s go for the idea of solving the entire problem or writing a report that everyone will love. This is simply a brain dumping process, which helps stimulate new ideas and connections.
Step 3 - Free associate

Put down all ideas without judgment or evaluation. As ideas emerge, write one or two word descriptions of ideas on line branching from the central focus and allow the ideas to expand outward into branches and sub-branches.

Step 4 - Thinking fast

Your brain work best in five to seven minute bursts, so capture the ideas as rapidly as possible. Keyword, Symbols and images provide mental short hand for recording ideas as quickly as possible.

Step 5 – Break boundaries

The bigger the paper, the more ideas you will have. Use different colours and styles.

Step 6 – Don’t Judge

Put everything down that comes into mind even if it is completed.

Step 7 – Keep moving

Keep your hands moving. If ideas slow down, draw empty lines, and watch your brain automatically find ideas to put on them?

Step 8- Allow organization

Sometimes, you see relationships and connections immediately and you can add sub – branches to a main idea. Sometimes you don’t do so you just connect the ideas to the central focus. The basic, ordering ideas in any
mind map are those words, which are the simplest and the most obvious ordering devices.

**Certain filtered points for quality Mind mapping are**

- Use colours, drawings and symbols.
- Keep the topics labels as short as possible
- Vary text size, colour and alignment

Copy of the lesson design prepared is given in Appendix IX

**4.7.7. Lesson Design based on Prevailing Activity Oriented Approach**

The investigator developed the prevailing method lesson manual verses each strategy. The formats of current prevailing methods used for all strategies are the same so the investigator explains one of the formats. It includes two sessions’ general elements and learning elements.

**Session 1-General elements**

- **General format** (Name of teacher, Name of School, Subject, Unit, Topic, Standard, Division and Duration.)
- **Curricular Objectives** (The investigator prepares curricular objectives based on each lesson/unit)
- **Learning Materials** (Learning materials means the aids of teaching learning process related to the topic/content)
- **Previous Learning** (The instructor should check the previous knowledge of the students related to the unit/topic)
Session 2 - Learning Elements

- **Presentation** (The introduction part of the lesson/topic should be given in presentation part)

- **Process and Response** (The teaching and learning process are considered as the process and response. Process means the activities of the student and response means output of the activities)

- **Activities** (Discussion, Demonstrations, Observation, preparation and presentation)

- **Summarization** (After discussion and preparation of activities, students present their collected data and summarize each group activity in the teacher’s version)

- **Follow up activities** (At the end of lesson designs, the instructor provides some assignments related to the topic/lessons). The investigator used the current activity method for the control group at every level of strategy

A copy of the lesson design prepared is given in Appendix X

4.7.8. **Pre-test and Post test (Achievement Test)**

The investigator prepared pre-test item before implementing the SCAMPER Technique among secondary school teachers. The investigator selected the IX standard students and selected one of the units from Social Science. For Experimental group and control group the investigator
selected the topic ‘Factors of Production’ for pre-test and post-test. She also considered the curricular objectives, content and item format.

The investigator decided on the purpose of the test and what she is interested in, measuring both in terms of objectives and content. After the selection of the unit/topic, the investigator selected the appropriate item format based on instructional objectives. In this test, the investigator selected the objective, short answer type test items.

In this, the item format was made susceptible to different types of analysis by investigator. At the time of preparation, the test included 25 questions; objective types and the 5 short answer type questions. After scrutinizing and editing the items, the test contained 20 items of which 15 objective type questions and 5 short answer type questions.

Total scores, duration, divisions and general instructions were included in the test items. The final test was developed to ensuring discrimination power and difficulty values. The curricular/instructional objectives and mental process are explained below.

**Curricular Objectives**

1. To acquire the knowledge about the factors of production
2. To identify the nature of land, labour, capitals and organization
3. To classify the different forms of land, labour and capital
4. To evaluate the functions of an organizer
5. To analyses the efficiency of labour in production process
6. To analyses the role of human capital in production process.

**Mental Processes.**

1. Retrieves/recollects/retells information

2. Readily make connections to new information based on past experiences, formulates initial ideas and concepts.

3. Detects similarities and differences

4. Classifies/categories /organizes/information appropriately.

5. Translates/transfer knowledge/understanding and applies them in new situations.

6. Establishes cause and effect relationship –make information and applies reasoning and draw inferences

7. Imagines/thinks /divers


Pre-test and Post test, weightage to curricular objectives, Weightage to Area, weighatege to Form of Questions, Weightage to Difficulty level, Blue Print, Question Wise Analysis and Answer Key are given in Appendix XI

**4.7.9. Participant Observation Schedule on Selected Strategies**

Participant Observation may be defined as the careful and systematic watching of facts as they occur in course of time. “Observation is to observe human beings in action without any element of reporting”. In the present study observation is the tool for evaluating teachers in the
classroom teaching. For this purpose the investigator used the Observation Schedule in the form of a rating scale constructed by the Researcher and her supervising teacher to find out the effectiveness of the strategies for better Teacher Accountability and Reflective Teaching among Secondary School Teachers in Kerala. The observation was made on the basis of 10 abilities of teacher in the class room. The investigator prepared separate Teacher Evaluation Profile for each strategy.

1. Participant Observation Schedule on SCAMPER Techniques
2. Participant Observation Schedule on SWOT Analysis
3. Participant Observation Schedule on Brain Based Learning
4. Participant Observation Schedule on Mind Mapping

Each profile included 10 statements, it is revealed that 10 major factors are needed in each strategy. Copy of the Schedules are given in Appendix, XII, XIII, XIV and XV.

4.7.10. Strategy Evaluation Proforma on select strategies

To find out the extent of each strategy for better teacher accountability among secondary school teachers in Kerala, the investigator used the Strategy Evaluation proforma. The researcher found out the utility and feasibility of the selected strategies in class room teaching to find out how teacher accountability among secondary school teachers in Kerala is developed. The investigator prepared the Strategy Evaluation Proforma the help of experts and supervising teacher. After getting the expert’s opinion, a
draft rating scale was prepared and pilot study was conducted among some teachers. It is a self assessing rating scale filled by the selected teacher sample conducting the each strategy in their classroom teaching. The investigator selected 3 statement and point rating scale and it included 10 statements for each strategy.

The investigator collected the data from selected teachers to ensure the effectiveness of each strategy. For purpose investigator prepared strategy evaluation Proforma and it was filled by the selected teachers (each strategy sample). SEP includes 10 statement followed ‘Great extent’, ‘Some extent’ and ‘Not at all’ rating scale.

The strategy evaluation Proforma 1 based on SCAMPER Technique selected teachers were calculated. This analysis reveals the effectiveness of SCAMPER Technique among secondary school teachers.

The percentage and results of Strategy Evaluation Proforma 2 based on SWOT Analysis of selected teachers were calculated. This analysis reveals the effectiveness of SWOT Analysis among secondary school teachers.

Strategy Evaluation Proforma 3 based on Brain Based Learning of selected teachers were calculated. This analysis reveals that, the effectiveness of BBL among secondary school teachers.

Strategy Evaluation Proforma 4 based on Mind Mapping of selected teachers were calculated. This analysis reveals that, the effectiveness of
Mind Mapping among secondary school teachers. Table of the Strategy Evaluation Proforma are given in Appendix, XVI, XVII, XVIII and XIX

Reliability of each strategy evaluation Proforma was obtained by the judgment of some experts in the educational field. Experts change some vague items and statements and on the basis of their evaluations and suggestions, the strategy evaluation Proforma was administered

Though there are different types of validity; the three types of validity which are most important in this study, they are content validity, construct validity face validity.

a) Content validity: - Content validity of strategy evaluation proforma is assumed by careful reference to the current literature.

b) Construct validity: - After pilot study, the vague question were found out and modified and simplified. Thus construct validity

c) Face validity: - Face validity is appeared measured facts or tool. In this study investigator kept face validity.

4.8. Pathways of Investigation

The investigator adopted survey- cum- experimental method for data collection. Using different procedures for survey and experimental study. After fixing up the problem, she prepared tools based on the objectives and hypotheses and considered the variables of the related study. To find out the extent of teacher accountability and reflective teaching among secondary school teachers, the investigator prepared separate scales.
Before preparing the scales, the investigator had gone through journals, dissertations resorted to the internet. From the different sources of information, the investigator can understand that the concept of teacher accountability and reflective teaching is a wide area of scope in teaching learning process. It is difficult to measure the extent of each variable; so the investigator included double statements in her scales in the form of statements. The first draft of the inventories includes 80 and 68 statements for teacher accountability and reflective teaching respectively. The investigator had discussed with the supervising teacher and experts. The statements of each scale were divided into several category based dimensions. For teacher accountability scale, the investigator selected 3 dimensions; personal accountability, professional accountability and social accountability and each dimension is again divided as several elements for analyzing the data. The final draft of the scales included 40 statements for each scale and the items in the scale were subjected to the procedure contained a Likert type 5 point scale.

After the preparation of the scales, the investigator collected data from secondary school teachers in Kerala, using stratified sampling technique. The sample comprised of 500 teachers from the select district of Kerala; Kannur, Kasargod, Kozhikode,Kottayam and Ernakulam. The investigator approached the Head of the institutions and contacted with the secondary school teachers (all subjects). For the reliability of the
inventories, the investigator used test-retest method and administered the same scale to 120 teachers after a break of three weeks. The obtained scores were correlated with the scores obtained in the first administration. All teachers had cooperated with the testing procedures and had responded to all the items in the scale. Subsequently the data sheets were collected and used software (SPSS) 2010 for scoring.

After analyzing the responses, the investigator found that the degree of teacher accountability and reflective teaching in comparatively average and low. To enhance the teacher accountability and reflective teaching among secondary teachers, the investigator selected SCAMPER technique and SWOT analysis strategies for teacher accountability and Brain Based Learning, Mind Mapping framing the reflective teaching practices with this purpose.

For the experimental study, the investigator selected 50 teachers based on the select strategies for curriculum instructional design. Before conducting the experimental study, the investigator established rapport among selected teachers and conducted the pre-test for experimental and control groups. The investigator developed lesson designs based on each strategy and implemented the strategy among secondary school students by the teachers concerned.

To find out the effectiveness of each strategy, the investigator prepared the Participant Observation Schedule and Strategy Evaluation
Proforma based on each strategy. Participant observation schedule is filled by the investigator at the time instructional practices of lesson design.

**4.9. Statistical Procedures Resorted**

In this study the investigator used descriptive and inferential statistics technique. Descriptive statistics are used to describe the basic features of the data in a study. They provide simple summaries of the sample and the measures. Descriptive statistics help us to simplify large amounts of data in a sensible way. Thus, we use inferential statistics to make inferences from our data to more general conditions; we use descriptive statistics simplify to describe what's going on in our data. We use inferential statistics to make judgments of the probability whether an observed difference between groups is a dependable one or one that might have happened by chance in this study. We begin with the research question, identify the dependent and independent variables involved, identify the level of measurement of every variable, and precede the accompanying table that will point to us the appropriate technique. The main idea of analysis of variance techniques is to describe the characteristics of a variable under study and to compare the means of a dependent variable with categories of a group.

The investigator analyses the collected data using the appropriate statistical technique of the software (SPSS) 2011. The statistical technique was used for the study.
1. Percentage Analysis

2. Arithmetic Mean

3. Standard Deviation

4. Critical ratio

5. Analysis of Co-Variance (ANCOVA)

In this chapter, the researcher explains the phased inception of the investigation, research designs of survey and experimental study, participants of the study, variables enacted for the study, tools and technique adopted for data collection, statistical procedures resorted to and pathways of investigation. The analysis and interpretation of the data collected and calculated through these analytical support and the techniques is given in the succeeding chapter.