CHAPTER IV
METHODOLOGY

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4.1 METHODOLOGY: A PREFACE

Research is an intellectual and creative endeavor to discover, develop and verify knowledge. It entails objective and systematic effort to offer solutions to the problem and to formulate policies and programmes. It is a scientific inquiry that is designed to collect, analyze and use data to understand, describe, predict or control an educational or psychological phenomena or to empower individuals in such contexts (Mertens, 2010). The accuracy and adequacy of the research findings depend upon the appropriateness of the method followed. A methodological trend that has been gaining momentum is the planned integration of qualitative and quantitative data within single studies or a coordinated series of studies (Cheryl and Denise 2012).

4.2 PATH FINDER OF THE METHODOLOGICAL JOURNEYING

The present study was focused on the set sequential staged procedure for developing certain strategies for transacting curriculum in commerce at the level of higher secondary education with specific emphasis to Problem Based Learning and Graphic Organizers. This multistage process of investigation going through the adornment of a mixed methodology coinciding both quantitative and qualitative approaches.

Mixed method approach is a stimulating merge of the application of both quantitative and qualitative methods simultaneously or sequentially. Mixed method is defined by Tashokorri and Creswell (2007) as ‘research in which the investigator collects and analyze data, integrates the findings and draws
inferences using both qualitative and quantitative approaches or methods in a single study or program of inquiry’. This method has particular value when a researcher is trying to solve a problem that is present in complex educational or social contexts (Teddlie and Tashakkori 2009).

### 4.3 SCHEMATIC TRAILS OF THE INVESTIGATION

![Figure 4.1 Schematic Trails of investigation](image-url)

**Phase I Induction**
- Semi Structured Interview
- Assess prevailing modes
- Problem Based Learning
- Instructional Strategy

**Phase II Development**
- Judgment Schedule
- Analyze constraints
- Experienced
- Graphic Organizers
- Instructional Strategy

**Phase II Experimentation**
- Achievement Test
- Vocational Competency
- Suggest Alternative modes
- Problem Based Learning
- Instructional Strategy

**Phase IV Evaluation**
- Self assessment Tools
- In depth Interview Guide
- Terminal Behavior
  - * Academic Achievement
  - * Vocational Competency
- Entry Behavior
  - * Academic Achievement
  - * Vocational Competency
- Strategy Evaluation Proforma
- Self Assessment Matrix
- Individual in-depth interviews
PORTRAYAL OF EACH PHASE

The study was conducted in four phases viz; Phase 1:- Induction Phase, Phase II:- Development Phase, Phase III: - Experimentation Phase and Phase IV: - Evaluation Phase.

The first phase of the study (Induction Phase) was meant for seeking reflections about the prevailing modes of curriculum transaction from a representative sample of commerce teachers and stakeholders at higher secondary level (N=75) through the mode of a Semi-structured Interview Schedule (Appendix A) prepared by the investigator. By synthesizing the ratings, opinions and interpretations of the interview schedule, the investigator reified and selected Problem Based Learning and Graphic Organizer as effective instructional strategies for transacting commerce curriculum higher secondary level.

The second phase of the study (Development Phase) was the major contribution of the study. Here the investigator developed two instructional strategies viz: Problem Based Learning and Graphic Organizer for transacting higher secondary commerce curriculum based on Dick and Carey Instructional Designs (1996). The two select strategies are standardized and validated through the Judgment Schedule (Appendix B). The third phase was the experimental phase; the investigator adopted the experimental procedure with the following end in view:
Methodology

- Testing the effectiveness of the select strategies with reference to Achievement in commerce and the assessment of Vocational Competency (outcome of commerce curriculum)
- Comparing the effectiveness of the select strategies with reference to gender and locale of students.

For this purpose, two experimental groups (I and II) and one control group were selected. Group I was taught using the developed Problem Based Learning strategy and the Group II was taught using the developed Graphic Organizer strategy; whereas the control group followed the prevailing activity oriented modes.

In the last phase of the study (Evaluation phase) focus was on the effectiveness of the developed strategies I and II. For this purpose, the investigator developed a Strategy Evaluation Proforma (Appendix G) for assessing the effectiveness of Problem Based Learning strategy and developed a Self Assessment Matrix for assessing the effectiveness of Graphic Organizer strategy (Appendix H) forms the qualitative dimensions of the study.

In addition to this, the investigator developed an In-depth Interview Guide (Appendices I & J) to establish the feasibility of the developed strategies (Problem Based Learning and Graphic Organizer) and also to evaluate the ongoing learning processing among the randomly identified select students.
4.4 RESEARCH DESIGN: TOWARDS THE COURSE OF ACTION

A research design of an experimental study is the blue print of the procedure that enables the researcher to test his/ her hypotheses by reaching valid conclusions about relationships between independent and dependent variables.

For the purpose of the present study, the Pre test Post test Non- Equivalent Groups Design (specified by Best and Kahn, 2007) were adopted.

The schematic design is given in Figure 4.2 below.

Here,

- Cx0 represents Pre test score of Control group;
- T0 the treatment given to Control group; and
- Cy0 the Post tests of the Control group;
- Ex1 and Ex2 represent the Pre test score of the Experimental groups
- T1 and T2 the treatment given to the two Experimental groups; and
- Ey1 and Ey2 the Post test scores of the two Experimental groups.
4.5 SAMPLE SELECTED FOR THE STUDY

The participants or sample selected for the study are described as follows. For the experimental part of the study students at higher secondary level from six schools coming under three districts of Kerala namely, Alappuzha, Kottayam and Thiruvananthapuram were selected as experimental and control groups. The students were selected randomly from among 376 higher secondary commerce students coming under the above said three districts. The distribution of participants or sample is depicted in Table 4.1

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Name of Institution</th>
<th>Locale</th>
<th>Gender</th>
<th>Group and Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>1</td>
<td>Metropolitan H. S. S., Puthencavu, Alappuzha</td>
<td>Rural</td>
<td>26</td>
<td>22</td>
</tr>
<tr>
<td>2</td>
<td>V.V.H.S.S,Thamarakkulam, Alappuzha</td>
<td>Rural</td>
<td>28</td>
<td>24</td>
</tr>
<tr>
<td>3</td>
<td>N.S.S.H.S.S,Kunnamthanam</td>
<td>Rural</td>
<td>28</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>Govt.H.S.S,Thrikkodithanam</td>
<td>Rural</td>
<td>22</td>
<td>19</td>
</tr>
<tr>
<td>5</td>
<td>S.B H. S.S,Changanacherry</td>
<td>Urban</td>
<td>48</td>
<td>-----</td>
</tr>
<tr>
<td>7</td>
<td>Cotton Hill H.S.S. Thiruvananthapuram</td>
<td>Urban</td>
<td>---</td>
<td>44</td>
</tr>
<tr>
<td>8</td>
<td>Govt Girls. H.S.S, Pattom Thiruvananthapuram</td>
<td>Urban</td>
<td>----</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>376</td>
<td>198</td>
</tr>
</tbody>
</table>
In order to analyze the effectiveness of the developed strategies viz; Problem Based Learning through a Strategy Evaluation Proforma and Graphic Organizer through a Self-assessment Matrix was also employed to this sample of 376 higher secondary commerce students mentioned above.

As part of qualitative study, a sample (N=75) comprising of higher secondary commerce teachers, subject experts in commerce and teacher educators were also selected. The details of the samples are given below:

Higher secondary school commerce teachers : 66
Subject experts in commerce : 09

4.6 VARIABLES ESTABLISHED FOR THE STUDY

Variables are the conditions or characteristics that the experimenter manipulates, controls or observes (Best and Kahn, 2007). Variables are the vital aspects of a testing condition that can change or take on different characteristics with different conditions, and are basically of two types viz; independent and dependent variable. The variable which is manipulated by the experimenter and is capable of including change is termed as ‘independent’ variable, and the variable that undergoes change as a result of the above manipulation is called the ‘dependent’ variable.

In the present study, the independent variables were:

- The prevailing Activity Oriented Mode
- The developed instructional strategies namely,
  - Problem Based Learning
Graphic Organizer

The dependent variables were

- Academic Achievement and
- Vocational Competency.

Those are the core outcome of curriculum transaction in commerce at higher secondary level.

In order to analyze the relationship between the select independent and dependent variables, specific tools/ investigative supports and techniques were adopted and they are detailed in the next section.

4.7 INVESTIGATIVE SUPPORTS AND THE TECHNIQUES EMPLOYED

The quality of any research depends largely on the efficiency of the tools involved and the procedures adopted for collecting data. In order to gather direct substantiation for the incremental elucidation of the effect of the developed strategies for transacting curriculum in commerce at higher secondary level, quite a few tools and techniques were employed. Table 4.2 gives an eye view on the same.
Table 4.2
Investigative supports and Techniques Employed for the Study

<table>
<thead>
<tr>
<th>Phase</th>
<th>Tools and Techniques Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase I Induction</td>
<td>Semi-structured Interview Schedule (Appendix A)</td>
</tr>
<tr>
<td>Phase II Development</td>
<td>Judgment Schedule for strategy validation (Appendix B)</td>
</tr>
<tr>
<td>Phase III Experimentation</td>
<td>Lesson designs based on Problem Based Learning(Appendix C)</td>
</tr>
<tr>
<td></td>
<td>Lesson designs based on Graphic Organizer (Appendix D)</td>
</tr>
<tr>
<td></td>
<td>Achievement Test in Business Studies (Appendix E)</td>
</tr>
<tr>
<td></td>
<td>Vocational Competency Assessment Test (Appendix F)</td>
</tr>
<tr>
<td>Phase IV Evaluation</td>
<td>Strategy Evaluation Proforma for Problem Based Learning (Appendix G)</td>
</tr>
<tr>
<td></td>
<td>Self Assessment Matrix for Graphic Organizer.(Appendix H)</td>
</tr>
<tr>
<td></td>
<td>Individual In-depth Interview Guide for Problem Based Learning (Appendix I)</td>
</tr>
<tr>
<td></td>
<td>Individual In-depth Interview Guide for Graphic Organizer (Appendix J)</td>
</tr>
</tbody>
</table>

The select tools and techniques developed for collecting relatable data have been classified under four phases namely, Induction Phase, Development Phase, Experimentation Phase and Evaluation Phase.

The ‘Induction Phase’ was intended to build a background for the conduct of the study by analyzing the prevailing modes of curriculum transaction in commerce at higher secondary level by interviewing the higher secondary commerce teachers and subject experts through a Semi-structured Interview Schedule. The second phase focus for developing two instructional strategies
Methodology

(Problem Based Learning and Graphic Organizer) for transacting higher secondary commerce curriculum. For validating the feasibility of the developed strategies I and II, the investigator adopted a Judgment schedule as a tool for the same.

The tools under the third phase - ‘Experimentation’ comprised of lesson designs based on Problem Based Learning, Graphic Organizer and activity oriented modes. Also to ascertain the outcome of curriculum transaction of commerce at higher secondary level, an Achievement Test in Business Studies and Vocational Competency Assessment Test was used as tools.

In addition to the quantitative assessment done in the earlier phase, a qualitative assessment of the developed strategies is done in the last phase for which, the instrumentation modes included a Strategy Evaluation Proforma for Problem Based Learning and Self Assessment Matrix for Graphic Organizer. In addition to this the investigator developed an In-depth Interview Guide for assessing ongoing learning processing of certain randomly identified cohorts in each strategy. The details of the high-flying investigative supports and techniques are described as follows.

4.7.1 SEMI-STRUCTURED INTERVIEW SCHEDULE

A semi-structured interview schedule is regarded as a set questionnaire with specific core questions determined in advance from which the interview branches off to explore in-depth information, probing according to the way the interview proceeded, and allowing elaboration, within limits (Best & Kahn,
In the present study, the Semi-structured Interview Schedule was employed to obtain the deliberations of a set of select samples of Commerce teachers on the specific areas of concern in connection with transacting the curriculum of commerce at higher secondary level namely,

- Prevailing modes of transacting higher secondary commerce curriculum;
- Constraints experienced, if any, by the teachers in the effective implementation of innovative strategies in the present set up; and
- Suggest alternative modes used for effective transaction of curriculum in commerce at higher secondary level.

In order to obtain appropriate information on these focal themes, an interview schedule was developed in such a manner that the respondents could give a free transmission of their views on the thrust dimensions. The initial draft of the schedule had 9 questions which were prepared through extensive searching, reading and discourses with subject experts and teacher educators. As a pilot study, a draft schedule with provision for extended opinions was distributed to 20 subject experts in the field of commerce education. The contributions and suggestions by the select experts were taken into consideration for developing the final draft schedule which focused the three core areas specified in the prior section. The final draft of the interview schedule comprised five questions with provision for open ended and closed responses. The interview schedule is appended as Appendix A.
Analysis of the qualitative determinants of the data collected through the semi-structured interview schedule highly advocates the need for developing suitable instructional strategies for effective transaction of curriculum at higher secondary level with special reference to commerce. It equip the investigator to explore and develop two instructional strategies namely, Problem Based Learning and Graphic Organizer suitable for attaining Vocational Competency and Academic Achievement those are the true outcomes generated towards the transaction of commerce curriculum. However, the interview helped the investigator to get an insight into the various criterion required for developing effective instructional strategies for transacting a good curriculum.

**4.7.2 JUDGEMENT SCHEDULE FOR VALIDATING INSTRUCTIONAL STRATEGIES AND LESSON DESIGNS**

After formulating the framework of instructional strategies namely Problem Based Learning and Graphic Organizer, the investigator followed Dick and Carey’s design used for developing the two select strategies for transacting higher secondary commerce curriculum. In order to judge these frameworks of curriculum transaction strategies with regard to the set design traits, a judgment schedule was prepared. This schedule comprises of seven design qualities namely product focus, authenticity, organization of knowledge, recognition, uniqueness, protection from unfavorable consequences and choice. This makes the schedule more objective, valid and reliable. This instrument is prepared in such a manner in which participants were asked to put their reflections against
each design qualities and their respective aspects. The judgment schedule was given for validation among the select experts from higher secondary school commerce teachers, subject experts in commerce and teacher educators in commerce and compiled their recommendations and suggestions in both design quality and their specific aspects and subsequently the tool was refined. The final form of the instrument was validated by a sample of experts including commerce teachers and teacher educators. The strategy is finalized based on the validation thus obtained.
DEVELOPMENT OF INSTRUCTIONAL STRATEGY
(Dick and Carey Model)

DEFINITION:
“The term instructional strategies used to cover the various aspects of sequencing and organizing the information and deciding how to deliver it” (Dick and Carey, 1996, p.178)

COMPONENT OF AN INSTRUCTIONAL STRATEGY
PROCESSING FLOW CHART TOWARDS THE WORKING OF INSTRUCTIONAL STRATEGY

Phase I
Pre-instructional Activities
- Objectives
- Motivational Activities
- Entry Behaviors

Phase II
Information Presentation
- Instructional Sequence
- Information
- Examples

Phase III
Learner Participation
- Practices
- Feedback

Phase IV
Testing
- Pre-test
- Post-test

Phase V
Follow Through Activities
- Remediation
- Enrichment
BRIEF SKETCH OF COMPONENTS OF AN INSTRUCTIONAL STRATEGY

Component 1: Pre-Instructional Activities

a. Motivation
b. Objectives
c. Entry Behaviors
   • Motivation activity to “hook” students on the value of the instruction
   • State learning objectives
   • Demonstration of what students will be able to do when they finish the tasks/course
   • Summarize relevant pre requisites that will act as a “bridge” to the new material

Component II: Information Presentation

a. Instructional Sequence
b. Information
c. Examples
• Review content analysis to determine exactly what information, concepts, rules, and/or principles will be delivered
• Review examples and non-examples
• Begin with lower level skills and progress up the hierarchy
• Teach pre-requisite skills before presenting information on higher level skills
• “Chunk” the information for learners

**Component III: Learner Participation**

a. Practice
b. Feedback
   • Provide students with activities relevant to the objectives
   • Provide students will opportunity to practice
   • Provide timely feedback (knowledge of results)
   • Reinforce students

**Component IV: Testing**

a. Pre-Test
b. Post-Test
   • combination of questioning, mini-quizzes, point-to-remember or single muddiest point exercises, or end-of-class review games ("embedded" testing)
   • give Post-test

Component V: Follow-Through Activities

a. Remediation
b. Enrichment
   • Remediation: remediation activities help the students to conscientize about who missed a concept; give specific recommendations as to what students should do as a result of particular levels of performance on the post-test.
   • Enrichment: enrichment activities to expand the knowledge of those who understood the material immediately, guide students to places where they can learn more.
DESIGN PROCESS OF PROBLEM BASED LEARNING INSTRUCTIONAL STRATEGY

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SUPERVISED BY

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INSTRUCTION TO THE PRACTITIONERS

- This strategy is developed mainly for the students belonging to higher secondary commerce stream

- This strategy focuses for developing ‘business concepts’ specified in business studies text book

- Practitioners should complete each phase systematically and follow the instructions accordingly

- This strategy aims for creating learner friendly instructional space in constructivist paradigm

- This strategy focuses for effective transaction of higher secondary commerce curriculum in terms of academic excellence and vocational competency among commerce students

- Ensuring active learner participation is the pivot of the select instructional strategy

- This strategy provides flexibility towards selection of content, grouping techniques, reflectivity assessment etc.
DESIGN FOR DEVELOPING COMPONENTS OF PROBLEM BASED LEARNING STRATEGY

COMPONENT I: PRE- INSTRUCTIONAL ACTIVITIES

Sub Components: A. Curricular Objectives
                  B. Motivational Activities &
                  C. Entry Behaviors

Directions:
The practitioner should set the desired curricular objectives systematically as per the selected content area and analyzes the entry behavior (pre-requisites) for the effective bridging of new knowledge and thereby preparing one or two motivational activities for ensuring readiness of learners for entering into the unique strategy.

The summarized version of Component I is presented as below:

<table>
<thead>
<tr>
<th>Curricular Objectives</th>
<th>Motivational Activities</th>
<th>Entry Behaviors</th>
</tr>
</thead>
<tbody>
<tr>
<td>* To enable the learner to analyze the nature, structure and purpose of business.</td>
<td><strong>Activity I</strong></td>
<td>1. Students should have knowledge about buying and selling of goods and services.</td>
</tr>
<tr>
<td>* To equip them to understand the social responsibility of business and</td>
<td></td>
<td>2. Students know about</td>
</tr>
</tbody>
</table>

...
<table>
<thead>
<tr>
<th><strong>Activity II</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Students should have an idea about stationary business.</td>
</tr>
<tr>
<td>4. Students should have knowledge about basic concept of “shares”.</td>
</tr>
<tr>
<td>5. Students should have knowledge about Bajaj Allianz, SBI life, etc.</td>
</tr>
<tr>
<td>6. Students should have awareness about export trade.</td>
</tr>
<tr>
<td>7. …………………………………….etc.</td>
</tr>
</tbody>
</table>
COMPONENT II: INFORMATION PRESENTATION

Sub Components:  
A. Instructional Sequence  
B. Information  
C. Examples

Instructions:

- The components II- IV can be developed by blending with Gagnon’s Constructivist Learning Designs.
- This design comprised of six phases viz; Situation, Grouping, Bridge, Task/ Questions, Exhibit and Reflection
- The respective sub components are integrated in to the phases of select Gagnon’s Constructivist Learning Designs
- The first phase of Gagnon’s Constructivist Learning Design(Situation Phase) interconnected with Component II only

<table>
<thead>
<tr>
<th>PHASES</th>
<th>LEARNING TASK/ LEARNING PROCESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. SITUATION</td>
<td>Stage I: Creating an ill-structured Problem with the support of examples</td>
</tr>
<tr>
<td></td>
<td>* Read the problem/ situation/ scenario carefully</td>
</tr>
<tr>
<td></td>
<td>* Clarifies the terms, facts, concepts, principles etc.</td>
</tr>
</tbody>
</table>
tactics. This phase going through…………

- Answering questions
- Creating metaphors
- Making decisions
- Drawing conclusions
- Setting goals

Focus Questions
1. What do teachers expect the students to do?
2. What will students make their own meaning?
3. What ways followed to formulate hypotheses?

- Make a precision definition of the problem and the learning task.

Stage II: Whole class discussion

- Assessment of the Problem.
- Proposition of Preliminary hypotheses.

Stage III: Formulation of Hypotheses.

- Organization of the Proposed hypotheses.
- Establishment of the information needed to reach solutions.

Stage IV: Re-formulate the ill-structured problem into a structured form.
4. How to convert the ill structured problem into a structured one?

<table>
<thead>
<tr>
<th>Stage V: Formulation of Learning Objectives.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Objectives 1. ..........................................................</td>
</tr>
<tr>
<td>• Objectives 2..............................................................</td>
</tr>
<tr>
<td>• Objectives 3..............................................................</td>
</tr>
<tr>
<td>• Objectives 4..............................................................</td>
</tr>
<tr>
<td>• etc.</td>
</tr>
</tbody>
</table>

COMPONENT III: LEARNER PARTICIPATION

Sub Components: A. Practice

B. Feedback

Instructions

• Gagnon’s Constructivist Learning Designs phases 2-5 (Grouping, Bridge, Task/Questions/ and Exhibit) should be integrated in Component III.
• Practitioners try to ensure all students participation
• Practitioners should flexibility in opting appropriate feedback mechanism to ensure the ongoing progress of the strategy
## PHASES

### II. GROUPING

Select appropriate process for grouping of materials and students.
(Depend upon the situation the instructor/teacher can select the design and the materials you have available to you).

For example:

<table>
<thead>
<tr>
<th>Whole Class</th>
<th>Group I</th>
<th>Group II</th>
<th>Group III</th>
</tr>
</thead>
</table>

### LEARNING TASK/ LEARNING PROCESS

**Stage I: Analyze/ Investigate the Sub Problems.**

* Divide the major situation/issue/problem into sub-parts/sub problem related with a specific task/process.

Sub Problem I:

Sub Problem II:

Sub Problem III:
## Methodology

### Stage II: Brain Storming Session
- Each member of the group is given the freedom to express his/her ideas for arriving at a draft solution of each sub-problem.
- Teacher ensures all members participation.
- Democratic way to reach consensus.
- Systematically prepare draft solution.

### III BRIDGE

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I: Students share their pre-analysis.</td>
<td>Stage II: Group synthesizes their ideas.</td>
</tr>
<tr>
<td>Identification of what is known / what is required. (GAPS)</td>
<td></td>
</tr>
<tr>
<td>Between what your students already know and what they might learn by explaining the situation.</td>
<td></td>
</tr>
</tbody>
</table>
Stage III: Group identifies learning issues.

………………………………………………………………
………………………………………………………………
………………………………………………………………

Stage IV: Group re-structures the sub-problems/ issues if needed.

………………………………………………………………
………………………………………………………………
………………………………………………………………

# Throw irrelevant point away.

Stage V: Formulation of Learning goals.

[ Try to get a systematic overview of the problem and setting goals based on it.]

………………………………………………………………
………………………………………………………………
………………………………………………………………
IV: TASK (QUESTIONS)

To introduce the situations and provide effective thinking (reflective) questions separately for each group member.

INDIVIDUAL STUDY

Stage I: Give sub-questions related to:

Sub- problem 1) ………………………………………………….? 
Sub- problem 2) ………………………………………………….? 
Sub- problem 3) ………………………………………………….? 

Stage II: Frame other questions to encourage them to explain their thinking.

Q1………………………………………………………………….? 
Q2………………………………………………………………….? 
Q3………………………………………………………………….? 

Stage III: Support them in continue their thinking process.

[ Each member of each group has individual thinking questions to find the information / task that had been assigned to him/ her by the group].
V: **EXHIBIT**

Students make an exhibit for others of whatever record they made to record their thinking and they were explaining the situation. It can be done in the following ways:

**COLLATION OF RESEARCH**

**Stage I:** Students find and write their own solutions to the problem.

Solution A) ……………………………………………………………………………

Solution B) ……………………………………………………………………………

Solution C) ……………………………………………………………………………

**Stage II:** Students compare their solutions with practitioner’s / teacher’s judgments.

**Stage III:** Write down a description on a card/ paper/ Prepare a report in details based on their findings.

**Stage IV:** Giving individual/ group presentation before the whole class with the support of graphs, charts, visuals, LCD’s etc.
COMPONENT IV: TESTING

Sub Components: A. Pre-Test
                B. Post-Test

Instructions:

- Gagnon’s Constructivist Learning Designs phase 6 (Reflections) should be integrated in Component IV.
- Carefully prepare reflective questions/assessment mechanisms to promote thinking skills.
- Instructors have freedom to prepare such reflective assessment instruments like brainstorming, concept maps, portfolios, journaling etc.
VI: REFLECTIONS

* Students’ reflections of what they thought about while explaining the problem and then saw the exhibits from others.

* Students’ reflect back on their products and Processes and assess their output (terminal Behavior) based on input (entry behavior).

Effectiveness of the strategy

| Entry Behavior | Terminal Behavior |

FINAL PRESENTATION OF RESULTS

Stage I: Identify the entry behavior

Stage II: Assessment of academic achievement:
- Assessment of the summary of the written collective report.
- Assessment of a summary of the individual work.
- Administration of Self Evaluation Proforma
- Administration of Achievement Test

Stage III: Assessment of Vocational Competency:
- Administration of Vocational Competency Assessment Test

Stage III: Estimation of Effectiveness of Strategy
- Compare entry behavior with terminal behavior
COMPONENT V: FOLLOW-THROUGH ACTIVITIES

Sub Components:  
A. Remediation  
B. Enrichment

Follow-up activities:  
Teacher provides another problems/ issues/ situations related with life to assess the motive of problem based learning strategy and to assess the efficacy of the strategy.  
Issue I  
………………………………………………………………………………………………………………………………  
………………………………………………………………………………………………………………………………  
Issue II  
………………………………………………………………………………………………………………………………  
………………………………………………………………………………………………………………………………

Remedial activity:  
Teacher prepares remedial teaching programmes to overcome the difficulties encountered by the learners.

Identification of Learning Difficulty:  
1) …………………………………………………………………………………………………………………………………………..  
………………………………………………………………………………………………………………………………………..  
………………………………………………………………………………………………………………………………………..

2) …………………………………………………………………………………………………………………………………………..  
………………………………………………………………………………………………………………………………………..  
………………………………………………………………………………………………………………………………………..

3) …………………………………………………………………………………………………………………………………………..  
………………………………………………………………………………………………………………………………………..  
………………………………………………………………………………………………………………………………………..

Remedial Programmes:  
Activity I:  
………………………………………………………………………………………………………………………………………..  
………………………………………………………………………………………………………………………………………..  
………………………………………………………………………………………………………………………………………..
<table>
<thead>
<tr>
<th>Enrichment activity:</th>
<th>Activity II:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher prepare an enrichment activity for motivate the learner for further learning.</td>
<td>........................................................................................................................................</td>
</tr>
</tbody>
</table>

**FORMULATION OF NEW LEARNING ISSUES**

Receipt of the Next Problem/Task:
........................................................................................................................................
........................................................................................................................................
........................................................................................................................................
........................................................................................................................................
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DESIGN PROCESS OF GRAPHIC ORGANIZER INSTRUCTIONAL STRATEGY

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A. ORIENTATION TO PRACTITIONERS

I. Graphic Organizer- Conceptual Version

- Graphic organizers are illustrative way of constructing knowledge and structuring information designed to benefit learners who have difficulty in organizing information.
- Graphic organizers are meant to help students clearly visualize how schemas are organized within content or surrounding a concept.
- Graphic organizers provide students with a configuration for abstract ideas.
- Graphic organizers can be categorized in many ways according to the way they dispose information: hierarchical, conceptual, sequential or cyclical.

(Bromley, Irwin- Devitis & Modlo, 1995)
A. ORIENTATION TO PRACTITIONERS

Guidelines to Practitioners

- Locate & connect key facts and ideas.
- Structuring textual information.
- Exploration and integration of information in cognitive organization.
- Summarize information as a meaningful whole.
- Culmination of concepts in hierarchical sequence.
- Systematic linkage of new schema with old one.

Course of Action

- To generate the Graphic organizer, teacher facilitates the students to contemplate on the bond between the materials and scrutinize the meanings attached to each of them.
- While creating a graphic organizer, the teacher enables the learners to prioritize the information, determining which parts of the objects located in the plot.
Teacher should know the many variations and possible combinations of graphic organizers used in the learning environment as an instructional strategies. Most of them plummet in to four basic categories namely cyclical organizers, conceptual organizers, sequential organizers, and hierarchical organizers.
TOWARDS THE COMPONENTIAL PROCESS OF GRAPHIC ORGANIZER
INSTRUCTIONAL STRATEGY

COMPONENT I: PRE- INSTRUCTIONAL ACTIVITIES

Sub Components:
A. Curricular Objectives
B. Motivation Activities
C. Entry Behaviors

Instructions:

- Practitioners should set the curricular objectives by systematic assembling of subject matter, learning process and evaluation procedure
- Practitioners should fix the expected outcomes (output) of learners in terms of sequential cognitive processing
- Select suitable graphic organizers and develop motivational activities by due inter locking of the select graphic organizers
- Practitioners should bear in mind the role of pre requisites/entry behavior act as scaffold for bridging new concepts, theories, principles etc.
COMPONENT I: PRE- INSTRUCTIONAL ACTIVITIES

DESCRIPTIONS OF SUB COMPONENTS:

A. CURRICULAR OBJECTIVES

- Enable students to gather information from prior experience and link with new information from instructional materials/media and place events/procedures in to a sequential order.
- Guide students to collect data regarding different points of view, values, attributes or themes that equip students to identify and summarize information systematically.
- Establishes relationships between a core concept with themes and details collected from multiple and/complex sources of information that act as visual tool to express ideas or to make meaningful whole.
- Develop probability in student’s predicting process and aid a visual schematic for the decision making process.
- Equip students to use a visual model for understanding the complex processes of inductive and deductive thinking and to provide students’ with a framework of solving problem.
- Enable students to classify large amounts of related information in a unit or course and help students to develop implications of concepts learned or to make applications of ideas across the curriculum.
- Help students to use clues to make inferences and to facilitate hypothetical thinking etc.
B. MOTIVATION ACTIVITY

Teacher/practitioner exhibits visual display of various categories of graphic organizers and provides one/two exercises/activities for creating motivation before the students thereby familiarizing different graphic organizers and enables the students for analyzing the uses of graphic organizers. This activity focuses for:

<table>
<thead>
<tr>
<th>Graphic Organizer (generalized pattern)</th>
<th>Motivational Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphic organizers come in many different forms, each one best suited to organizing a particular type of information.</td>
<td>Activity 1</td>
</tr>
<tr>
<td><strong>Graphic organizer is a tool for</strong></td>
<td>........................................</td>
</tr>
<tr>
<td>• creative thinking</td>
<td>........................................</td>
</tr>
<tr>
<td>• organizing information</td>
<td>........................................</td>
</tr>
<tr>
<td>• understanding concepts and relationships</td>
<td>........................................</td>
</tr>
<tr>
<td>• depicting schemas and cognitive structures</td>
<td>........................................</td>
</tr>
<tr>
<td>• self learning</td>
<td>........................................</td>
</tr>
</tbody>
</table>
Graphic Organizers are classified as:

- **Hierarchical organizers**
  Present main ideas and supporting details in ranking order.

- **Comparative organizers**
  Depicts similarities among key concepts.

- **Sequential organizers**
  Illustrate a series of steps or place events in a chronological order.

- **Cyclical organizers**
  Depict a series of events that have no beginning.

- **Conceptual organizers**
  Includes main concept supported with facts, evidence, characters etc.

<table>
<thead>
<tr>
<th>Activity II</th>
</tr>
</thead>
<tbody>
<tr>
<td>..................</td>
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<tr>
<td>..................</td>
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<td>..................</td>
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</tbody>
</table>
C. ENTRY BEHAVIORS / PRE-REQUISITES

- In the pre-instructional phase, the practitioners bear in mind what prior experience already the learner has or what concepts and ideas the learner has accommodated in their existing cognitive structure.
- Pre-requisites/ entry behaviors/ prior knowledge collections can focus on any one of the following:
  - Use learning tools/ materials.
  - Use a thinking process. (e.g.; analyzing structure of business, predicting the future economy)
  - Use content related issue/ situation.(e.g.; allotment of shares, delegation of authority, Social responsibility of business)
  - Use a specific instructional strategy/ method (e.g.; co-operative learning strategy- Think- pair-share)
  - Use a cognitive function (reflection) or deficiency (impulsivity).
  - Use an instructional tactics/ techniques (brain storming/ buzz session/ think-pair-share)
COMPONENT II: INFORMATION PRESENTATION

Sub Components:  
A. Instructional sequence  
B. Information  
C. Examples

Instructions

- Present the specific Graphic Organizer for a topic/ for developing a concept
- Point out its objectives and Organizational framework
- Use examples to illustrate the use of specific Graphic Organizers

Guidelines

The practitioner/teacher describes an array of specific graphic organizers that can be used in many areas of topics in “Business Studies”. They are accompanied by brief descriptions, step-by-step procedures and examples. However, teachers are reminded to modify the ideas to meet their own needs. The modification should depend on student’s developmental level and their experience with graphic organizers. Certainly, the modification itself is a valuable opportunity for achieving the specific curricular objectives and mental processes.
**Name**: Hierarchy Diagram  
**Description**: This organizer can be used to help students see super-ordinate and subordinate categories of a concept or a topic. It clarifies relationship between and among concepts/ topic in different levels.

**Structure of the Organizer**:

<table>
<thead>
<tr>
<th>Main Topic</th>
<th>Sub Topic</th>
<th>Sub Topic II</th>
<th>Sub Topic III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept</td>
<td>Concept</td>
<td>Concept</td>
<td>Concept</td>
</tr>
<tr>
<td>Concept</td>
<td>Concept</td>
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<td>Concept</td>
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<tr>
<td>Concept</td>
<td>Concept</td>
<td>Concept</td>
<td>Concept</td>
</tr>
</tbody>
</table>

**Procedure**

1. Choose a relevant topic and write it in the box at the top of the given organizer.  
2. Brain storm a list of the components of the topic.  
3. Merging the ideas in to different levels of ranks and levels.  
4. Write the first subordinates in the boxes in the second level. Add or delete boxes whereas appropriate.  
5. With materials that have more than two levels, students can add additional levels to the organizer.

**Example**

| Name | Hierarchy Diagram  
| Topic | Structure of Business |

```
Structure of Business

Private Enterprise
  - Sole Proprietorship
  - Partnership
    - Limited Partnership
    - Joint stock company
  - Public Company

Public Enterprise
  - General partnership
  - Limited Partnership
  - Joint stock company
  - Public Company
```
COMPONENT III  LEARNER PARTICIPATION

INSTRUCTIONS:

- Practitioners should evolved all students participation in this phase
- Care should taken for selecting appropriate Graphic Organizers
- Ensure that select graphic organizers are sufficient to interlock the learning task as per stipulated time
- Pairing, grouping and exchange process should systematically undertake

The instructional process of this section is shown as below:
DESCRIPTION OF COMPONENT III

The component III was developed by blending Dr. Raymond Hurst’s 5 E instructional model’s first four phases in the instructional process which comprised 5 phases; namely; Engagement, Exploration, Explanation, Elaboration and Evaluation. The descriptions are:

<table>
<thead>
<tr>
<th>PHASES</th>
<th>(A) PRACTICES / PROCESSES</th>
<th>(B) FEEDBACK / RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Teacher presents a situation/issue/problem related with content before the students with the support of suitable graphic organizer. This graphic organizer acts as pre-requisites for accessing the learners’ prior knowledge and helps them become engaged in a new concept through the use of short activities that promote inquisitiveness. The select graphic organizer should make associations between past and present learning experiences, expose prior connections, and organize students’ thinking toward the learning outcomes of current activities.</td>
<td>Teacher go through each phases and immediately point out the mental process/ thinking process of • Individual student • Paired response • Integration • Group task</td>
</tr>
</tbody>
</table>
**Exploration**

Students get opportunity for analyzing different graphic organizers and identify each one’s procedure and structures. (Individual task & Group task). Then teacher divides the class into different groups and provides activities for each group by developing new concepts. Teacher motivate each group for selecting suitable graphic organizer through which students get the opportunity to actively explore the concept in an effective manner. This establishes a commonly shared classroom experience and allows students to share ideas about the concept. Experiences occur before the explanations. Students acquire a common set of concrete experiences allowing them to help each other understand the concept through social interaction.

- Discussion
- Consolidation
- Exchange
- Collaboration
EXPLANATION

Here students get the opportunity for selecting more and appropriate graphic organizer for verbalizes their understandings from the "exploration "phase. Teachers use questioning strategies to lead students’ discussion of information discovered during the Explore stage and for completing the graphic organizer with in the specified time. Teachers introduce new scientific terms and explanations at appropriate times during the discussion. When students engage in meaningful discussions with other students and the teacher, they can pool their explanations based on observations, construct new understandings, and have a clear focus for additional learning.

- Verbal Presentation
- Reflection
- Justification
- Meaningful Learning
Students’ works in group/pair to complete a new task/develop a new concept/apply the concept in a new situation/solve a problem through graphic organizer with in the stipulated time. Here students are encouraged to apply, extend, and enhance the new concept and related terms during interaction with the teacher and other students. Providing additional active learning opportunities for students to incorporate into their mental construct of the concept allows them to confirm and expand their understanding. Elaboration deepens understanding by using concepts in new situations. Students apply knowledge and skills in new but similar situations. Similar to exploration students can make observations, collect data and make decisions while testing ideas and hypotheses. Activities can include reading articles and books, writing, designing other experiments, and exploring related topics, preparing projects etc.

- Drawing conclusion
- Equilibration
- Hypothesizing
- Problem Solving
COMPONENT IV : TESTING AND FOLLOW-THROUGH ACTIVITIES

Sub components : A. Remediation

B. Enrichment Activities

Directions:

• This component IV can be developed by blending the last phase of Raymond Hurst’s 5 E instructional model, named as ‘evaluation’

• Practitioner’s have freedom to select appropriate remediation program as well as enrichment activities

• Care should taken to select activities benefited to the target group to analyze their strength and weakness.
### Teacher’s action
Teacher presents a project based situation/issues to the students related with the select content area for evaluation purpose. Teacher provides embedded questions/ testing tools related to the select concept/issue and motivate them to complete the task with the support of appropriate graphic organizers.

### Student’s action
- Identify and select the most suitable graphic organizer

### Evaluation/Testing

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Follow-Through Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1). Identification of learner competencies/ attainment of Curricular objectives.</td>
<td></td>
</tr>
<tr>
<td>…………………………………………………………..</td>
<td></td>
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<tr>
<td>…………………………………………………………..</td>
<td></td>
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<tr>
<td>…………………………………………………………..</td>
<td></td>
</tr>
<tr>
<td>(2). Identification of Learning difficulties.</td>
<td></td>
</tr>
<tr>
<td>…………………………………………………………..</td>
<td></td>
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<tr>
<td>…………………………………………………………..</td>
<td></td>
</tr>
<tr>
<td>…………………………………………………………..</td>
<td></td>
</tr>
<tr>
<td>(3). Identification of Learner needs.</td>
<td></td>
</tr>
</tbody>
</table>

### Follow-Through Activities

(A) **Remediation Programmes**

Activity 1
……………………………………………………………………..
……………………………………………………………………..
……………………………………………………………………..
Activity 2
……………………………………………………………………..
……………………………………………………………………..
……………………………………………………………………..
(Give specific recommendations as to what students should do as a result of particular levels of performance on their terminal behaviour).
for answering the testing questions/ complete the task.

- Reflect the meaningful bonding of concepts in the suitable graphic organizer specified in the task.

**Assessment**
Give a post-test to assess the academic achievement of the select sample.

**Strategy Evaluation Proforma**
Give an evaluation proforma to find the effectiveness of the strategy.

<table>
<thead>
<tr>
<th>(B) Enrichment Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity 1</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Activity 2</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>(Guide students to places where they can learn more).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(4) Self assessment of strengths and weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strengths</td>
</tr>
<tr>
<td>__________________________________________</td>
</tr>
<tr>
<td>Weaknesses</td>
</tr>
<tr>
<td>__________________________________________</td>
</tr>
</tbody>
</table>
4.7.3 LESSON DESIGNS BASED ON PROBLEM BASED LEARNING

Problem Based Learning is student centered, inquiry oriented, curriculum integrated instructional strategy. Students acquire content information and knowledge by using processes such as exploration, research and collaboration. Students learn to formulate a problem statement, develop action plans, conduct information searches, use data, find and use resources, work collectively with others both within the school and outside the school, arrive at conclusions, and communicate findings to others.

The lesson design on Problem Based Learning was developed by incorporating the phases of Constructivist Learning Design by Gagnon (2006). The phases are visually depicted in the following figure 4.3

![Diagram of Lesson Design Processing Circuit](image)

---

**Figure 4.3 Lesson Design Processing Circuit**

The phases are explained in detail as below:

**PHASE 1: SITUATION**

In situation phase students constructs knowledge rather than receive information.

This phase deals with:
→ Critically analyze the situation/issue/task/problem

→ Creating metaphors and link it with the problem/issue

→ Make apt predictions and drawing conclusions

→ Setting goals and formulate objectives.

A Situation
Answers

Key questions

What teachers expect the students to do a task/engage an issue/problem?

How will your students setting goals and objectives?

How will students make their own hypotheses and derive sub issues?

PHASE II: GROUPING

This phase focuses on:

→ Encourage the students to identify reflective partners or group of colleagues with whom to do reflective work.

→ Select right process for grouping and organizing of instructional materials

→ Try to ensure that the specific group constructs quality of product, the group can consider ways, means, and assessments that will strengthen everyone’s work and, subsequently, leads students better learning.

Writing a Group element

Key Questions

How will organize students in to groups?

What materials will students use to make meaning?

How will arrange physical resources to facilitate learning?

PHASE III: BRIDGE

This phase deals with:
Build a bridge between what students already know and what they are expected to learn by describing student’s developmental level.

A bridge organizes students into a collaborative environment and builds a scaffold among students.

A bridge creates a shared understanding that gathers information about what each student knows.

### PHASE IV: TASK

This phase aims for:

- An open question put to learners who have all the resources they need to respond.
- The task is similar to an activity or exercise for students to do that often begins the thinking about a design for learning.
- Think through active responses to the questions uphold further thinking process.
PHASE V: EXHIBIT

This phase involves:

- Students make an exhibit for others of whatever record they made to record their thinking as they were explaining the situation.
- An exhibit requires students to share their work with others besides a teacher.
- Engagement with students as they create an exhibit of their thinking will inform how you design subsequent learning.
- Students who engage with the ideas, questions, and observations of others emerge with a deeper understanding of their work.

PHASE VI: REFLECTION

This phase offers:

- Students get the opportunity to think again about their individual and collective learning, to begin the integration of new learning, and to design strategies for the next learning episode.
- Analyzing what students were thinking and learning during in learning episode leads to a better understanding of learning, teaching, and the learning-design process.
- Reflection focus to consider the explanations of thinking made during exhibit.
4.7.4 LESSON DESIGNS BASED ON GRAPHIC ORGANIZER

Graphic Organizer is an instructional strategy that enables teachers to show and explain relationships between content and sub content and how they in turn relate to other content areas. Through the use of the organizers, students can make more abstract comparisons, evaluations, and conclusions. The lesson designs on Graphic Organizer were developed by incorporating Dr. Raymond Hurst’s 5 E instructional models. The model comprises of 5 phases, the lesson processing circuit is shown in Figure 4.4 as shown as below:

![Figure 4.4 Lesson Design Processing Circuit](image-url)
Phase I: ENGAGEMENT

5E model lesson plans start with an engagement activity. Engagement activities capture attention, promote thinking, raise questions, identify misconceptions, generate comments and make connections to prior knowledge. The activity should be a problem or an event that raises questions and motivates students to discover more about the concept.

Teacher
Teachers ask questions and engage them in the guided inquiry lessons.

ENGAGEMENT

Students
Students make connections to prior knowledge

Instructional process
The curriculum task accesses the learners’ prior knowledge and helps them become engaged in a new concept through the use of short activities.

Phase II: EXPLORATION

Exploration experiences provide students with a common base of activities within which current concepts, processes, and skills are identified and conceptual changes is facilitated. Learners may complete activities that help them use prior knowledge to generate new ideas, explore questions and possibilities, and design and conduct preliminary investigation. Here students involved in the topic so they can develop their own understanding.
Phase III: EXPLANATION

The explanation phase focuses students’ attention on a particular aspect of their engagement and exploration experiences and provides opportunities to demonstrate their conceptual understanding, process skills, or behaviors. This phase also provides opportunities for teachers to directly introduce a concept, process, or skill. An explanation from the teacher or the curriculum may guide them toward a deeper understanding, which is a critical part of this phase.

Phase IV: ELABORATION

Teachers challenge and extend students’ conceptual understanding and skills.
Through new experiences, the students develop deeper and broader understanding, more information, and adequate skills. Students apply their understanding of the concept by conducting additional activities. These activities challenge students to apply what they have learned and extend their knowledge and skills. They practice skills and behavior in new situations.

**Phase V: EVALUATION**

This phase focuses on assessing how much learning has taken place; assess their knowledge, skills, and abilities. It allows teachers to evaluate student progress toward achieving the educational objectives. In this phase, both students and teachers determine how much learning and understanding has taken place.
4.7.5 ACHIEVEMENT TEST IN BUSINESS STUDIES

Achievement test can be defined as a test designed to measure the effects of specific teaching in an area of curriculum. In this study, the investigator developed and standardized an achievement test in Business Studies to:

✓ to estimate the pupils’ harmonized output of the interplay of the set levels of curricular objectives of higher secondary school pupils in Business Studies;

✓ to grade pupils in terms of their achievement as low, average and high performance;

✓ to evaluate the efficacy of select instructional strategies- Problem Based Learning, Graphic Organizer and Prevailing Modes;

✓ to assess the criterion behavior of pupils both prior to and after experiment.

As no specific standardized test was available on the content area ‘External Trade’ for standard XI in the Kerala Syllabus. The test items comprising of the descriptive type items, standardized and administered in the present study because descriptive type items demand the learners to harmonize the set levels of curricular objectives. For fulfilling the procedure of standardization of this achievement test construction, a draft form comprising 18 test items was drafted according to the set curricular objectives and was pilot tested on 60 students at higher secondary level. The test was revised with respect to their feedback. The revised test was tried out among 120 pupils at higher secondary level for item
analysis. The ‘facility value’ and ‘discrimination index’ of the items were calculated for item analysis using the formula specified by the Examination Reforms Committee, Calicut University. According this method, the facility value and discrimination power of the items were estimated using the formula:

\[
\text{Facility value} = \left\{ \frac{\text{Total marks obtained by all the students}}{\text{No. of students} \times \text{maximum marks allotted to the question}} \right\}
\]

Discrimination index = Facility value of top ranking 27% students – Facility value of low ranking 27% students.

The items having both facility value between 0.65 and discrimination index greater than 0.40 were selected for the final form of the test. 13 questions thus selected were subjected to expert judgment by experienced teachers and teacher educators both B.Ed and M.Ed level and recommended remarks were assimilated. Separate answer sheets were provided to all students. A copy of the test is given as Appendix E. The question paper was prepared based on the pattern of question paper setting followed in activity based approach of SCERT.

**Reliability of the Achievement Test**

Reliability of the test was established through split half method using Spearman Brown Prophecy formula \( R = \frac{2r}{(1+r)} \) where \( R \) is the reliability co-efficient of the whole test and \( r \) is the co-efficient of correlation between the half tests. The value of co-efficient of correlation between the half tests was 0.846 and the reliability co-efficient of the whole test was 0.821. Hence the test was found reliable.
Validity of the Achievement Test

Validity refers to the adequacy and appropriateness of the interpretations made from assessments, with regard to a particular use. As far as an achievement test is concerned, content validity and statistical validity are important.

Content Validity

It refers to the adequacy with which the test items represent the conceptual domains of interest. It examines whether the test includes all the important aspects of the target that we wish to measure and whether the various aspects are properly weighed. The investigator consulted various subject experts in the particular area regarding the test items. Hence, the test is found to have content validity.

Empirical or Statistical Validity

The product moment coefficient of correlation was calculated using the achievement test scores (prepared by the investigator) and the scores obtained in the Business Studies in the pre test and post test conducted in the school. The correlation coefficient obtained was 0.846 which shows that the test has a good statistical validity.

Objectivity

The objectivity of the test was ensured by using scoring key and marking scheme for valuation.
Practicability

The prepared achievement test is easy to administer. It is economical as it is reusable in the sense that separate answer sheets were provided. Time needed for writing the test and scoring the test was also minimum. Hence, the test has good practicability.

4.7.6 VOCATIONAL COMPETENCY ASSESSMENT TEST

As data-gathering devices, tests are among the most useful tools of educational research as they provide the data for most experimental and descriptive studies in education (Best & Kahn, 2007). In the context of the transaction of curriculum in commerce at higher secondary level, the nature of the curriculum of commerce aims at both for attaining Academic Achievement and also to develop Vocational Competency among students.

As no specific standardized tests were available to test the Vocational Competency of commerce students at higher secondary level and to know the impact of the developed strategies over vocational competence, a standardized test was prepared and administered in the present study. As the test is focused on analyzing the vocational competence of commerce students at higher secondary level, test tasks that give a convincing proof of the sample’s ability to actually applied the various components of Vocational Competency in ways and contexts which correspond to real life situations. The following components are taken in to consider for preparing the test items:
✓ planning
✓ decision making
✓ creative thinking
✓ risk bearing
✓ financial and time management

For the purpose of standardization of the test, a draft form comprising 40 situational test items was initially prepared and was pilot tested on 55 students. The test was revised with respect to their feedback. The revised test was tried out among 110 pupils at higher secondary level for its item analysis. The ‘facility value’ and ‘discrimination index’ of the items were calculated for item analysis using the formula specified by the Examination Reforms Committee, Calicut University. According this method, the facility value and discrimination power of the items were estimated using the formula:

\[
\text{Facility value} = \frac{\text{Total score obtained by all the students}}{\text{No. of students} \times \text{maximum score allotted to the question}}
\]

Discrimination index = Facility value of top ranking 27% students – Facility value of low ranking 27% students.

The items having both facility value between 0.65 and discrimination index greater than 0.40 were selected for the final form of the test. 28 questions thus selected were subjected to expert judgment by research guides, experienced teachers and teacher educators and recommended remarks were assimilated.
Validity of the Vocational Competency Assessment Test

Validity refers to the adequacy and appropriateness of the interpretations made from assessments, with regard to a particular use. As far as the Vocational Competency test is concerned, content validity and statistical validity are important.

Content Validity

It refers to the adequacy with which the test items represent the conceptual domains of interest. It examines whether the test includes all the important aspects of the target that we wish to measure and whether the various aspects are properly weighed. The investigator consulted various subject experts in the particular area regarding the test items. Hence, the test is found to have content validity.

Empirical or Statistical Validity

The product moment coefficient of correlation was calculated using the Vocational Competency assessment scores (prepared by the investigator) and the scores obtained in the pre test and post test conducted in the school. The correlation coefficient obtained was 0.780 which shows that the test has a good statistical validity.

Objectivity

The objectivity of the test was ensured by using scoring key for valuation.
Practicability

The prepared Vocational Competency test is easy to administer. It is economical as it is reusable in the sense that separate answer sheets were provided. Time needed for writing the test and scoring the test was also minimum. Hence, the test has good practicability.

4.7.7 STRATEGY EVALUATION PROFORMA (PROBLEM BASED LEARNING)

An Evaluation Proforma is a tool with an array of statements that requires the respondent to put their opinions regarding an event in an authentic manner. In the present study, where higher secondary commerce students were being addressed for a couple of weeks, it was observed that the students exposed to the developed Problem Based Learning strategy showed explicit change in their classroom interaction pattern and learning style than the students who were exposed to the conventional mode of learning. These changes that are vital cannot be represented through test scores alone. Therefore, qualitative interpretations on the efficacy of the developed Problem Based Learning strategy was necessary as the higher secondary commerce students were the beneficiaries of these strategies for a period of three weeks, which is sufficient to throw deeper insight into the effect of Problem Based Learning strategy. For this purpose, an Evaluation Proforma finally comprising of 10 statements was developed. Before finalization a draft proforma with 14 statements were prepared which were discussed and opined with subjects experts by ensuring the validity of the tool.
and finalized with modifications pointed out by them and was administered to the Experimental Group I. The proforma also focused on analyzing the interaction pattern of students when exposed to the Problem Based Learning strategy. The data collected through these proforma were analyzed qualitatively. The Evaluation Proforma for Problem Based Learning has been appended as Appendix G.

4.7.8 SELF ASSESSMENT MATRIX (GRAPHIC ORGANIZER)

A matrix is an assessment tool that verbally describes and scales levels of student achievement on performance tasks (Burke, 2008). The matrix specifies the presence or absence of certain identified attributes against which a student’s performance or end product is judged. According to him, matrix allows individuals to assess and track numerical data in an expanded way. Burke (2008) is quick in adding that matrices serve to assist students in improving their own performance.

In the context of the present study, a Self Assessment Matrix for assessing the effectiveness Graphic Organizer was developed. The matrix was analytical in nature as it was designed to provide information regarding specific expectations and give descriptors that clearly outline what is needed for a higher performance. This Self Assessment Matrix enabling the higher secondary commerce students to discover the underlying system of Graphics, Links and Linking Lines, Contents, Arrangement of Concepts, Designs and Evaluation. During the ongoing process, the rated performance lay down for each cell of the matrix of
continuum of expertise determinants was exemplified accurately and comprehensively; and were conversed among the select experts for getting judgment and consequently validated statements are finalized. The draft matrix initially developed was validated during the phase through pilot test on a sample of 65 students at higher secondary level selected at random to test its proficiency and to ensure the feasibility by avoiding emergent uncertainties and constraints. Along with this, the time schedule of the matrix and the instructions for administering it were drafted and the final draft with essential dimensions of matrix was fixed. Also the matrix (Appendix H) ensures reliability as the construct specified in the tool is based on sound theoretical framework that defines the essential features of Graphic Organizer.

Validating the Matrix

In order to ensure objectivity of the matrix, it was submitted to a select panel of experts from the field of commerce education and verified the authenticity of matrix with respect to,

- subjectivity in evaluation
- clarity of strands described
- comprehensiveness of the strands of academic excellence in commerce
- attainment of the prominent components of Vocational Competency in the competitive era.
Thus validity of the matrix was established by availing the expertise of the eminent personalities in the field and the tool was considered as reliable as it in strict adherence to the foundation of the conceptualized version of the theoretical framework enunciated by National Research Council (2001) and the modalities of curriculum transactions followed by practitioners in the fields. As a corollary to the above phenomenon of reliability, the trustworthiness of the data procured through the instrument was further corroborated by correlating the ratings made by the select sample of students with their respective teachers. The extracts of the matrix were modeled on several standard formats proposed by Goodrich (1997); Ronis (2008); Sudharma and Mathai, Anita (2010) & Sudharma and Asha (2011). The data thus gathered through this validated instrument have been analyzed qualitatively and presented in the subsequent chapter.

4.7.8 INDIVIDUAL IN-DEPTH INTERVIEW GUIDE

The in-depth interview is a qualitative method of analysis, which proceeds as a confidential and secure conversation between an interviewer and a respondent. By means of a thorough composed interview guide, which is approved by the client, the interviewer ensures that the conversation encompasses the topics that are crucial to ask for the sake of the purpose and the issue of the survey. In-depth interviews are a useful qualitative data collection technique that can be used for a variety of purposes, including needs assessment, program refinement, issue identification, and strategic planning.
The method of the in-depth interview is appropriate if you need to gain an insight into individual evaluations of specific material. Namely the method can produce very precise and specific answers as well as an exhaustive and varied knowledge about individual determined experiences, opinions and motives, which the group interview and the quantitative methods cannot encompass.

An in-depth interview most often takes place in a controlled environment, where the respondent is in his or hers natural surroundings. In this way, the respondent is relaxed and therefore open and willing to reply to the exhaustive questions. An in-depth interview typically varies between 1½ and 2 hours and is recorded systematically for the sake of the following analysis and the writing of the report.

By considering these aspects on experiential space, the investigator randomly identified three students belongs to below average, average and above average strata from both strategies based on the scores of entry behavior. Separate interview guide was developed for strategy I (Problem Based Learning Group) and strategy II (Graphic Organizer Group). The focus questions come under the in depth interview guide in initial draft had 9 questions which were prepared through extensive searching, classroom observation and interaction sessions with experts and teachers. As a preliminary study, a draft guide with provision for specialist opinions was distributed to 12 subject experts in the field of commerce. The contributions and suggestions by the select experts were take in to consider for developing the final draft guide which comprised five questions
with provision for open-ended question only. The in-depth interview guide is appended as Appendix I and Appendix J.

The focal points to be extracted from the in-depth interview as:

- Examination of prior curriculum transaction strands
- Effectual instructional practices to articulate proficiency in commerce learning
- Pathways of select strategies rejuvenate to strengthen vocational competencies
- Felt difficulties experienced by you while practicing this strategies
- Suggestions and recommendations for upgrading these strategies in instructional space

The outcome of in-depth interview act as a vehicle for assessing the feasibility of the select strategies qualitatively that strengthen the efficacy of both strategies.

**4.8 PROCEDURE ADOPTED**

The present study was conducted in accord with mixed method approach as it has stepped through the different phases of developing certain strategies namely, Problem Based Learning and Graphic Organizer and analyzing the effect of the select strategies in bridging core outcome of effective transaction of
curriculum in commerce in terms of Academic Achievement and Vocational Competency.

The induction phase of the study, the investigator undergone an inspection to evaluate (a) prevailing modes of transacting higher secondary commerce curriculum (b) constraints experienced by commerce teachers in the effective implementation of innovative instructional strategies and (c) alternative modes for effective transaction of higher secondary commerce curriculum.

With select sample of higher secondary school senior and junior commerce teachers, commerce experts at college level and teacher educators from B.Ed and M.Ed level have placed their precious experiences, reflections and suggestions with the support of a semi-structured interview schedule, which facilitates the backdrop of the study. Accommodating the resounding modes from the semi-structured interview and the notional dimensions of various curriculum transaction attributes, the investigator go through the second phase of the investigation, developed and validated two instructional strategies namely Problem Based Learning and Graphic Organizer for the transaction of curriculum in commerce at the level of higher secondary education.

In the experimentation phase, Pre test Post test non-equivalent group design was adopted to assess the effectiveness of the select instructional strategies. A random sample of 376 higher secondary school commerce students belonging from eight schools of Thiruvananthapuram, Alappuzha and Kottayam districts were located and were categorized as two experimental groups and one
control group as described in Table 4.1. The two experimental groups were treated with each of the select curriculum transaction strategies respectively and control group with the prevailing activity oriented modes of curriculum transaction. A test in Academic Achievement in business studies and Vocational Competency assessment test were administered as Pre test Post test before and after the treatment of independent variables. The experiment was conducted during normal hours at the select institutions. The scores synthesized through the Pre test and Post test were inquest quantitatively to ascertain the effectiveness of the select curriculum transaction strategies.

To affix a qualitative perspective to the analysis of the effectiveness of the select strategies, adopted a strategy evaluation proforma and a self assessment matrix were administered the evaluation phase of the study. The strategy evaluation proforma administered among students of Problem Based Learning group and self assessment matrix administered among students of Graphic Organizer group. Also the investigator conducted an in-depth interview among the samples of six students (three each in both strategies) which are identified randomly in the pre test scores with the support of an in-depth interview guide developed by the investigator to authenticate the outcome of the select instructional strategies in the grass root level. Thus, the modus operandi of study was sum up through these varied strata of data collection and deliberations.
expressed by stakeholders in commerce, teacher educators, school practitioners at various levels and students.

STATISTICAL TECHNIQUES USED

Statistical techniques assist the investigator to outline coherent conclusions of any research study. In the present study, the investigator made use of the following statistical techniques to extract well-found conclusions.

- t-test of significance
- Analysis of Variance (ANOVA)
- Duncan’s Multiple Range Test for Post Hoc Analysis
- Analysis of Covariance (ANCOVA)
- Estimation of adjusted means

The analysis and interpretation of the data thus collected through these investigative supports and the techniques employed is given in the succeeding chapter.