Chapter 4

METHODOLOGY

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4.1 Methodological guidelines

Research methodology is a fluid form of investigation and narrative enquiry, which consists of multilayered, and multi stranded methods as well as a series of calculated measures and procedures for collecting and analyzing data systematically. It refers to the broader principles of research underscored by philosophical rationales (Guthrie, 2010). This chapter unfolds the research context and the overall design employed in the present study.

The objective of the present study is to test the effectiveness of certain Meta cognitive classroom practices for enhancing Meta cognitive skills for the students having varied learning styles upon the learning of Malayalam language at secondary level. A stream of students from secondary level of education was selected for the study. The eighth standard students from various schools of Kerala who followed state syllabus were the participants of the study. The details of methodology adopted for the present study are described under the following heads that is depicted in Figure 4.1.

Figure 4.1. Methodological Design at a glance
4.2 Method Adopted

In the present study a mixed method of research design, incorporating both quantitative and qualitative data collection and analysis was used. Integrating these two methods simultaneously provided the study with new insights, consistency in findings and detailed results which helped to cancel out the weaknesses of both quantitative and qualitative research techniques. A schematic design of the methods employed for the present study is given in Figure 4.2.

![Schematic design of the two sections of methods employed for the study.](image)

4.3 Research Design

The Research Design of an experimental study is the dynamic teaching sequence took place in the context of real classrooms that enables the researcher to test the hypotheses by reaching valid conclusions about relationships between independent and dependent variables. It situates the researcher in the empirical world and sits between the research questions and the data, showing how the research question will be connected to data, and what tools and procedures to use in answering them (Punch, 2009). It also refers to
the conceptual backdrop within which the experiment is conducted. For the purpose of the present study, the pre-test post-test Non-equivalent group Design was adopted.

The group exposed to the experimental treatment was the intervention group and the other group exposed to the activity-oriented treatment was the control group. To compensate for the lack of equivalency between the two groups, the investigator has applied the technique of Analysis of Covariance. At first, a pre test was administered among the selected groups and subsequently they were randomly assigned to the experimental procedures. A schematic representation of the research design of the study is given in Figure 4.3.

![Figure 4.3. Schematic representation of the research design of the study.](image)

- **CX₀** - represents pre test scores of control group
- **T₀** - treatment given to control group
- **CY₀** - post test scores of control group

- **EX₁, EX₂ and EX₃** represent the pre-test scores of three experimental groups, **T₁, T₂, and T₃** represent the treatment given to the three experimental groups and **EY₁, EY₂ and EY₃** represent the post test scores of the three experimental groups.
4.4 Educational settings of the study.

The study was conducted in six phases that are briefly described below.

Phase 1. Collecting and analyzing the opinions of school practitioners and experts about the prevalent status of curriculum transaction modes in Malayalam language with special reference to Meta cognitive classroom practices at secondary level.

Phase 2. Figuring out the learning styles of students with special reference to their sensory modalities.

Phase 3. Collecting students self report on their Meta cognitive awareness.

Phase 4. To find out the effectiveness of intervention procedures in heightening the academic achievement and meta cognitive awareness of students at secondary level.

Phase 5. Assessing the academic achievement and meta cognitive awareness of students after the implementation of intervention practices through achievement test (post) and re-administration of meta cognitive awareness rubric.

Phase 6. Substantiating the effectiveness of the select Meta cognitive classroom practices by collecting evidences through qualitative investigation.

Sequential patterning of the phases and tools employed in the study are depicted in Figure 4.4.
Figure 4.4. Sequential patterning of the instrumentation employed for different phases of the study

As cited in the figure (4.4) the first phase was meant for seeking responses from selected sample of school practitioners, language experts and teacher educators at various levels through the mode of semi-structured interview that focused on three major dimensions namely:

- Brief sketch on language learning
- Factors leading to remain mute during the pathways of learning.
- Ways for developing and strengthening Meta cognitive Environment in the classrooms.

In the second phase the investigator administered a Learning Style Inventory for the secondary school students (N=331) of the selected schools to find out their learning preferences based on their sensory modalities. Four schools were selected for the purpose of the study. Among them, three schools come under intervention group and one under control group. After getting response of learners on learning style inventory, the frequencies of each response on each item was counted. The learner having maximum number of frequency of a response for a particular learning style considered as having that specific type of
learning style. For example, a subject has a number of frequencies of responses 5, 9, 14 for Visual, Auditory and Kinesthetic alternates respectively, and then the subject was considered as Kinesthetic. Thus, the researcher calculated proportions of different types of learners with regard to their learning preferences for getting an awareness of total categories of students having different learning styles. The proportion of each category of learners having varied learning preferences were inflicted in Table 4.1

Table 4.1. Classification of learners based on their preferred learning styles.

<table>
<thead>
<tr>
<th>Name of the school</th>
<th>Total students</th>
<th>Type of learners</th>
<th>No. of learners</th>
<th>Percentage of learners</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. N.S.S Boys High school, Pandalam</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Class A)</td>
<td>40</td>
<td>Visual</td>
<td>15</td>
<td>37.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auditory</td>
<td>11</td>
<td>27.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kinesthetic</td>
<td>14</td>
<td>35%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Visual</td>
<td>13</td>
<td>31.7%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auditory</td>
<td>21</td>
<td>51.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kinesthetic</td>
<td>7</td>
<td>17.07%</td>
</tr>
<tr>
<td>(Class B)</td>
<td>41</td>
<td>Visual</td>
<td>13</td>
<td>31.7%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auditory</td>
<td>21</td>
<td>51.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kinesthetic</td>
<td>7</td>
<td>17.07%</td>
</tr>
<tr>
<td>B. Govt.V.H.S.S. Thrikkodithanam</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Class A)</td>
<td>40</td>
<td>Visual</td>
<td>17</td>
<td>42.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auditory</td>
<td>9</td>
<td>22.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kinesthetic</td>
<td>14</td>
<td>35%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Visual</td>
<td>15</td>
<td>34%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auditory</td>
<td>19</td>
<td>43.18%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kinesthetic</td>
<td>10</td>
<td>22.72%</td>
</tr>
<tr>
<td>Class B</td>
<td>44</td>
<td>Visual</td>
<td>15</td>
<td>34%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auditory</td>
<td>19</td>
<td>43.18%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kinesthetic</td>
<td>10</td>
<td>22.72%</td>
</tr>
<tr>
<td>C. Metropolitan H.S Puthencauvu.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Class A)</td>
<td>39</td>
<td>Visual</td>
<td>18</td>
<td>46.15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auditory</td>
<td>10</td>
<td>25.6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kinesthetic</td>
<td>11</td>
<td>28.20%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Visual</td>
<td>7</td>
<td>15.90%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auditory</td>
<td>19</td>
<td>43.18%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kinesthetic</td>
<td>18</td>
<td>40.90%</td>
</tr>
<tr>
<td>(Class B)</td>
<td>44</td>
<td>Visual</td>
<td>19</td>
<td>45.23%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auditory</td>
<td>10</td>
<td>23.80%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kinesthetic</td>
<td>13</td>
<td>30.95%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Visual</td>
<td>10</td>
<td>24.39%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auditory</td>
<td>17</td>
<td>41.46%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kinesthetic</td>
<td>14</td>
<td>34.14%</td>
</tr>
<tr>
<td>D. N.S.S. G.H.S. Pandalam</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Class A)</td>
<td>42</td>
<td>Visual</td>
<td>19</td>
<td>45.23%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auditory</td>
<td>10</td>
<td>23.80%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kinesthetic</td>
<td>13</td>
<td>30.95%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Visual</td>
<td>10</td>
<td>24.39%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auditory</td>
<td>17</td>
<td>41.46%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kinesthetic</td>
<td>14</td>
<td>34.14%</td>
</tr>
<tr>
<td>(Class B)</td>
<td>41</td>
<td>Visual</td>
<td>19</td>
<td>45.23%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auditory</td>
<td>10</td>
<td>23.80%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kinesthetic</td>
<td>13</td>
<td>30.95%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Visual</td>
<td>10</td>
<td>24.39%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auditory</td>
<td>17</td>
<td>41.46%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kinesthetic</td>
<td>14</td>
<td>34.14%</td>
</tr>
</tbody>
</table>
The above-mentioned schools belong to categories A, B, C, were considered as Intervention groups and the last category as control group. After administering a pre-test to all the selected students, the researcher implemented explicit instruction on classroom practices interlinked with the components of Meta cognition to the students in the intervention group and activity oriented instruction to the control group. At the end of the treatment, a post test was administered over each group. The third phase was meant for assessing the stylistic strands of Meta cognitive awareness- Planning, Monitoring and Evaluating-through the administration of a rubric. The Rubric was administered on the select sample of students at secondary level to assess the extent of awareness levels on the components of Meta cognition.

In the next phase of the study (phase 4) the select sample were given a pre-test and then classified into four groups. The treatment was administered in the order shown in Figure 4.3. The experimental groups were exposed to the select Meta cognitive classroom practices namely, Graphic Organizer, Self Questioning and Problem Solving and the control group was exposed to the prevailing modes of curriculum transaction. An observational checklist was also administered as a monitoring technique to assess the learner’s performance while they engaged in the learning process. ‘Student Generated Rubric’ was developed for making them aware of the criteria and dimensions embedded in the process of evaluation which is an important component of meta cognition. In phase 5, a post test on academic achievement and meta cognitive awareness was administered to the select groups in order to assess the effectiveness of the select Meta cognitive classroom practices on the academic achievement of Malayalam language at secondary level.
The last phase, (phase 6) was scheduled to collect students’ responses with regard to the effectiveness of select Meta cognitive classroom practices for the betterment of achievement in Malayalam language and the awareness level of their Meta cognition. Subsequently, an evaluation proforma was administered on the experimental group for getting a clear vision about the efficacy of the select Meta cognitive classroom practices. In addition to that, the investigator collected the written reports of students about the effect of the Meta cognitive classroom practices towards improving their competencies in language learning and analyzed the experiences.

4.5 Participants of the study.

The participants selected for the study are described as follows:

(a) Secondary school students from four schools belong to three districts of Kerala namely, Pathanamthitta, Alappuzha and Kottayam were selected as experimental and control groups. The distribution of the participants of the study is given in Table 4.2.

(b) In addition to the above sample, as part of qualitative study a sample of experts including School practitioners in secondary

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Name of the institution</th>
<th>Treatment</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>N.S.S.B.H.S.Pandalam</td>
<td>Graphic Organizer(G.O)</td>
<td>84</td>
</tr>
<tr>
<td>2.</td>
<td>Metropolitan H.S.Puthencavu</td>
<td>Self Questioning(S.Q)</td>
<td>83</td>
</tr>
<tr>
<td>3.</td>
<td>Govt.V.H.S. Thrikkodithanam</td>
<td>Problem Solving(P.S)</td>
<td>83</td>
</tr>
<tr>
<td>4.</td>
<td>N.S.S. G. H.S. Pandalam</td>
<td>Activity oriented modes of curriculum transaction.</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>331</td>
</tr>
</tbody>
</table>
level, Experts in the field of Malayalam language, Teacher Educators at B.Ed and M.Ed levels were also selected. (N=77). The details of the sample of select experts are given below:

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Practitioners</td>
<td>60</td>
</tr>
<tr>
<td>Teacher Educators at B.Ed level</td>
<td>10</td>
</tr>
<tr>
<td>Teacher Educators at M.Ed level</td>
<td>4</td>
</tr>
<tr>
<td>Experts in the field of Malayalam language</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>77</strong></td>
</tr>
</tbody>
</table>

(c) Along with this, a few secondary school students (12 students) from each experimental group were also selected for collecting learning experiences in this specific situation from the select schools at secondary level.

### 4.6 Variables Enacted for the study

Variables are the conditions or characteristics that the experimenter manipulates controls or observes (Best & Kahn, 2010). They are the vital aspects of a study and are mainly of two types – Independent variable and Dependent variable.

**Independent variable:** The variable that is manipulated by the experimenter and is capable of including change is termed as the independent variable. As the present study is to test the effectiveness of certain Meta cognitive classroom practices on the secondary school students, the following variables were selected as independent variables.

1. Curriculum transactional modes based on
   a) Graphic Organizer
   b) Self-Questioning
   c) Problem Solving
2. Learning styles
3. Prevailing activity oriented modes of curriculum transaction.

**Dependent variables:** The variable that undergoes change because of manipulation is called the ‘Dependent’ variable. In the present study the dependent variables were

- Academic achievement in Malayalam language.
- Awareness about Meta cognition.

The interrelationships between the variables are sequentially patterned in Figure 4.5.

![Diagram of interrelationships between variables](image)

**Figure 4.5. Diagrammatic presentation of Interrelationship between variables.**

**4.7 Tools and Techniques**

Appropriate analytical support or tools and techniques mark the performance of a study to the most effective and sophisticated manner. The details of the select analytical supports are described in the succeeding session.

**4.7.1 Semi-Structured Interview**

A semi-structured interview is regarded as a set questionnaire with specific core questions determined in advance from which the
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interview branches off to explore in-depth information, probing according to the way the interview preceded, and allowing elaboration within limits. Within the constraints of everyone’s time and commitment, the investigator employed the interview technique to gather the reflections, and trace out the reactions and thoughts of a select sample of language teachers with regard to the prevalent status of Malayalam language learning with special reference to Meta cognitive classroom practices. This interview gives ample opportunity for experts to express some suggested practices for the qualitative empowerment of Malayalam language learning and the ways to instill the needed Meta cognitive skills among the students at secondary level.

The prepared Interview guide comprised of 15 questions for multiple choice and open ended responses has unlocked three stipulated dimensions namely,

a) Brief sketch on language learning processes

b) Factors leading to remain mute amidst the pathways of learning

c) Suggested paradigms for developing and strengthening Meta cognitive Environment in the classrooms.

The data gathered through the prepared interview guide enabled to identify a few practices that are helpful for building a Meta cognitive environment in the classrooms, which is essential for getting awareness about the learning process carried out. The interview guide was employed not only for collecting the opinion about differentiated modes of instructional practices with regard to the curriculum
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transactional modes in Malayalam language, but also to explore their level of applications of meta cognitive strategies in their classrooms as an innovative practice.

Pathways in the validation process of Interview Guide

The draft of the interview guide was prepared through analyzing the theoretical overview and discourses with select experts and teachers of Malayalam language Education. The draft schedule comprised of 15 items with provisions for marking comments and recommendations was distributed to 80 language teachers. The comments and recommendations by the experts were incorporated and redrafted the interview guide, which probed the three core areas mentioned earlier in this section. The final draft of the interview guide comprised 11 questions aimed to analyze the prevailing instructional practices of Malayalam language learning and the needed improvement in order to create independent and autonomous learning climate in the classroom. They also highlight the need for cultivating differentiated instruction towards a progressive change in the learning of Malayalam language.

The next session, ‘Factors leading to remain mute amidst the pathways of learning’ focused on identifying the constraints experienced by the school practitioners towards implementing meta cognitive experiences for the students in the language classroom set up. The remaining session, ‘Suggested paradigms for developing and strengthening Meta cognitive Environment in the class rooms ‘helps to capture the reflections from the experts with regard to the implementation of meta cognitive classroom practices in the classrooms.

Experienced language experts modified the wordings and the number of items and validated the contents of the interview guide. It
enabled the investigator to codify the questions in the interview guide with that of research purpose. Thus, the data collected through the semi-structured interview served as a stepping-stone to identify the significance of creating Meta cognitive classroom climate towards enhancing Meta cognitive awareness of students and the need for paying much attention to the differentiated instructional practices for enriching the learning outcome of students in language classroom. The Interview guide is appended as Appendix A.

4.7.2 Learning Style Inventory

With the help of the research supervisor, the investigator prepared a learning style inventory with special reference to the sensory modalities of secondary school students for assessing their preferences in learning. The investigator also standardized the inventory by following the accepted procedures that are given below.

Preparation and Standardization of learning style inventory

The inventory containing an initial draft of 90 items was prepared and standardized using the qualitative and quantitative processes. School practitioners, Language experts and high school students were involved in the standardization process. Opinion and suggestions of experts (N=50) were used for qualitative process of standardization and the students’ scores (N=150) were taken for the quantitative aspects. The steps adopted for the preparation of LSI (Learning Style Inventory) were described in the following section.

The investigator analyzed books, periodicals, internet resources and other descriptive materials to procure the requirements for getting directions for the selection of items of the Learning Style Inventory. In addition to that, the investigator referred previous studies, related
literature and collected valid information from experts through formal and informal discourses. The personal experience of the investigator as a teacher educator internalized through the curriculum transactional modes enabled to devise appropriate frame works in this respect. After getting deep understanding regarding the concept of learning style, the investigator started to write the items for the learning style inventory.

The draft inventory with 105 statements (35 statements for each learning style) was subjected to the experts’ opinion and they were requested to validate and rate the draft inventory statements with their valuable remarks for each statement. They were asked whether the same statements with the five ratings could be used to assess the learning preferences of the students. They were requested to rank each statement as SA, A, UD, DA, and SD. The expert validation with their valuable remarks helped the investigator to filter even the minute defects. Based on their suggestions and discussions with the supervising teacher, the investigator selected only most of the SA and agreeable statements, and removed all the other statements. In this stage, 15 statements were removed and the number of statements retained is 90 after the modification with the large group expert survey.

The draft inventory (Appendix B) with 90 items was administered to 150 students of standard VIII from various schools of Alappuzha and Pathanamthitta districts. Necessary instructions were given prior to the administration of the learning style Inventory. Under the guidance of the investigator, the students were able to mark their performance in the response sheet. Out of the 150 response sheets, only 145 response sheets were received as completed and they were scored and were arranged in a descending order of the total score. The highest 27% and the lowest 27% of the response sheets were
separated. These were criterion groups in terms of which evaluation of the individual statements were done. For evaluating the responses of the high and low groups to the individual statements, the ratio was found using the formula,

\[ t = \frac{\bar{X}_H - \bar{X}_L}{\sqrt{\frac{S_H^2}{n_H} + \frac{S_L^2}{n_L}}} \]

Where

- \( \bar{X}_H \) - the mean score on a given statement for the high group
- \( \bar{X}_L \) - the mean score on the same statement for the low group
- \( S_H^2 \) = the variance of the distribution of responses of the high group to the statement
- \( S_L^2 \) = the variance of the distribution of responses of the low group to the statement
- \( n_H \) = the number of subjects in the high group
- \( n_L \) = the number of subjects in the low group

(if \( n_H = n_L = n \), we select the same percentage of the total number of subjects for the high and low groups. Then formula can be written as:

\[ t = \frac{\bar{X}_H - \bar{X}_L}{\sqrt{\frac{\sum(X_H - \bar{X}_H)^2}{n(n-1)} + \frac{\sum(X_L - \bar{X}_L)^2}{n(n-1)}}} \]

- \( \bar{X}_H \) = mean score on a given statement for the high group
- \( \bar{X}_L \) = mean score on the same statement for the low group
- \( \bar{X}_H^2 \) = score for a given individual for a given statement in the high group
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\[ \bar{XL}^2 = \text{score for a given individual for a given statement in the low group} \]

\[ N = \text{number of subjects in the criterion group}. \]

The statements for which ‘t’ value is greater than or equal to 1.75 was regarded as an item, which possesses internal consistency and hence discriminating power. 30 statements having ‘t’ value lower than 1.75 are rejected from the draft form. Thus, 60 statements with options were selected for the final inventory.

Thus the finally selected and standardized 60 statements were analyzed with the supervising teacher and based on the instructions given by the teacher, the investigator used these 60 statements as the final inventory and titled it as the ‘Learning style Inventory’. These 60 statements finally selected were arranged from 1-60 numbers in such a way that the first 20 (1-20) statements were meant for ‘Visual’ learning style group, the next 20 (21-40) for the ‘Auditory’ learning style group and the last 20 (41-60) for Kinesthetic learning style group.

Validity  It refers to the meaningfulness of the interpretations and uses of a test-score and it is the most important property of an assessment. Content validity requires both item validity and sampling validity. It is the degree to which the test measures the intended content area and it is determined by expert judgement. In the present context, the investigator discussed the items in the learning style inventory with various experts in the field of language education and made appropriate modifications in the items and hence ensured content validity.
Reliability relates to the consistency of the assessment results and the extent to which the test scores are free from errors of measurement.

Test-retest reliability

In the present study, the Test-retest reliability co-efficients were calculated for establishing the reliability of learning style inventory. For this purpose, a sample consisting of 90 boys and 80 girls were selected. Learning style inventory was administered over the sample at the interval of 60 days. The responses of the subjects on learning style inventory were scored with reference to the learning style as Visual learning style score, Auditory learning style score and Kinesthetic learning style score using scoring key. After scoring, the co-efficient of co-relation were calculated for the scores obtained on two administrations. The co-efficient of correlation for Visual learning style, Auditory learning style and Kinesthetic learning styles scores are presented in Table 4.3.

Table 4.3 Test- re test reliability co-efficients of correlation for different learning style scores.

<table>
<thead>
<tr>
<th>Group</th>
<th>Visual learning style</th>
<th>Auditory learning style</th>
<th>Kinesthetic learning style</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.918**</td>
<td>0.904**</td>
<td>0.929**</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2 tailed)

According to the Table 4.3, co-efficients of co-relation for Visual learning style scores, Auditory learning style scores, Kinesthetic leaning style scores were 0.918, 0.904 and 0.929 respectively. All of the three values were high and significant. It means the learning style inventory was reliable. The final form of the learning style inventory is given in the Appendix C.
4.7.3 Self assessment Rubric on the differentiated components of Meta cognition.

A Rubric is a particular format used to assess with a deeper view into a wide range of student performances. It provides meaningful ways to evaluate the extent to which students are meeting the standards and are frequently accompanied by anchors of products or performances to illustrate the score points on the scale. It is a transparent guide for assessment driven instruction for students to monitor their own learning or set of expectations used to assess their level of understanding which enable them to refine learning in accordance with the higher level. In the context of the present study, a self-assessment Rubric on Meta cognitive components -- Planning, Monitoring and Evaluating were developed. The rubric was analytical in nature as it was designed to provide data regarding specific expectations and give specific descriptors that clearly outline what is needed for a higher level of performance. The tool was also meant to build a theoretical framework of Meta cognitive processes and identify the select areas that need attention.

A Road map to the components of prepared Rubric.

In order to make intentional and effective learners, certain conscious patterns of learning and the ability to use that type of information to direct or regulate one’s own learning and redirect their efforts productively with perseverance are needed. Students can be guided to develop an understanding of what they know and do not know and can help them to learn how to learn with greater independence. The rubric was prepared after extensive reading, discourses with language experts, and was developed in consonance with the phase specified by Deepka (2007) and Goodrich (1997).
The different stages involved in the construction of the Rubric are given in Figure 4.6.

![Diagram of Rubric Construction Stages]

**Figure 4.6. Progression of the rubric**

The detailed description of each stage in the procedure is provided in the following part.

**Developing checklist**

The preliminary step in creating a rubric is the preparation of a checklist of components to be evaluated. The investigator prepared a checklist that provides a clear vision about the learners having deeper awareness about the components of Meta cognition. Table 4.4 shows the checklist developed in this regard.
Table 4.4. Checklist of components included in the Meta cognitive awareness rubric.

<table>
<thead>
<tr>
<th>Items</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to identify the pre requisites for learning</td>
<td></td>
</tr>
<tr>
<td>Able to organize the information clearly</td>
<td></td>
</tr>
<tr>
<td>prioritization of the task objectives</td>
<td></td>
</tr>
<tr>
<td>Schematic modulation of resource management</td>
<td></td>
</tr>
<tr>
<td>Periodical review and checking the progress in learning</td>
<td></td>
</tr>
<tr>
<td>Revising and evaluating effectiveness of the strategy used</td>
<td></td>
</tr>
<tr>
<td>Reflection on the thematic conceptualization of information</td>
<td></td>
</tr>
<tr>
<td>Resort participatory engagement</td>
<td></td>
</tr>
<tr>
<td>Awareness about self evaluation</td>
<td></td>
</tr>
<tr>
<td>Able to set and specify the goal</td>
<td></td>
</tr>
<tr>
<td>Space for meta cognitive discussions</td>
<td></td>
</tr>
</tbody>
</table>

Administration of this checklist enabled to list the criteria to be included in the rubric to assess the Meta cognitive awareness. The criteria are demarcated as Planning, Monitoring and Evaluation. ‘Planning’ includes ability to set goals, schematic modulation of time and resources, prioritization of objectives, selecting the strategy and the like. Periodical review and checking progress in learning, evaluating the effectiveness of the strategy are embedded in ‘Monitoring’ criteria. Reflection and summarization, Debriefing, Meta cognitive discussions come under the category of ‘Evaluation’.

Developing continuum is the third stage of Rubric preparation. After determining the criteria to be evaluated, the point scale for the rubric was decided. Accordingly, the scale ranging from 1 to 4 was selected. The strongest performance level was given a score of 4 and the weakest performance lever was given 1. The performance descriptors for the various levels were chosen as: Exceeds expectations, Meet Expectations, Partially Meet Expectations and Does not Meet.
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Expectations (Centre for Advanced Research on language Acquisition CARLA). ‘Exceeding expectations’ demonstrates detailed explanation regarding the criteria. ‘Meet expectations’ demonstrates good awareness. ‘Partially meet Expectations’ demonstrates some awareness. ‘Does not meet expectations’ demonstrate limited or poor awareness about the criteria evaluated. The descriptors for each level of quality were developed starting from the highest level of quality to the lowest. Care was taken to make the descriptors clear and precise and the scoring procedures were then ascertained. The developmental levels of rubric selected in the study are described as in Table 4.5.

Table 4.5. Developmental levels of Rubric.

<table>
<thead>
<tr>
<th>Levels of performance</th>
<th>Behavior descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceeds Expectations</td>
<td>Gives a detailed description about the criteria</td>
</tr>
<tr>
<td>Meet Expectations</td>
<td>Demonstrates good awareness</td>
</tr>
<tr>
<td>Partially Meet Expectations</td>
<td>Some type of awareness</td>
</tr>
<tr>
<td>Does not Meet Expectations</td>
<td>Demonstrates poor awareness about the criteria</td>
</tr>
</tbody>
</table>

‘Yes’ response for all elements related to each component could be summed across the total instrument to obtain overall rating on the goals decided earlier.

Evaluating effectiveness

The draft rubric initially prepared was validated during this phase through pilot test on a sample of 80 students at secondary level selected at random to test its dexterity and to ensure feasibility by avoiding constraints. Along with this the time schedule of the rubric and the instructions for administering it were framed and the final draft of rubric was fixed.
Validating the Rubric

In order to ensure the trustworthiness of the rubric it was given to a select panel of Experts from the field of Language teaching and the authenticity of the Rubric was checked in terms of:

- Clarity of components
- Comprehensiveness of the selected components
- Utility and practicability
- Relevance of the meta cognitive strategy instruction

Thus, the validity of the rubric was established by availing the expertise of the eminent personalities in the field of Malayalam Language Education and the tool was considered as a valid one. The excerpts of the rubric were modeled on several standard formats proposed by Goodrich (1997), Deepka (2007) Sudharma and Asha (2011). The Rubric was then administered on the select sample of secondary school students to assess the extent of awareness on Meta cognitive components. The data thus gathered through this validated instrument have been analyzed qualitatively and presented in the subsequent chapter. The final draft of the Rubric has been given as Appendix D.

4.7.4 Test of academic achievement in Malayalam Language.

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 and Kahn, 2010). It is mainly meant for assessing the effectuation of a particular strategy towards a creditable action completed. The present study was aimed to examine the effectiveness of the select Meta cognitive classroom
practices on the academic achievement of Malayalam language students. To study the effectiveness of Meta cognitive classroom practices, the researcher measured the achievement of Malayalam language with the help of an achievement test. As no specific standardized performance test was available on the topic, ‘Urvarathayude Sangeetham’ of standard 8th, was prepared and administered by the investigator as a standardized test in the present study.

For the purpose of standardization of the test, a draft form comprising ten items was initially prepared and was pilot-tested on 75 high school students. The ‘Facility value’ and ‘Discrimination index’ of the questions were calculated using the formulae specified by the Examination Reform Committee, Department of Calicut University (1974). They are:

Facility value of a question =

\[
\frac{\text{Total mark obtained by all students on the particular question}}{\text{No of students} \times \text{Maximum marks allotted to the question}} \times 100
\]

Discrimination index = (Facility value of top-ranking 27% students - Facility value of low-ranking 27% students)

The items having both facility value between 0.35 and 0.65 and discrimination index between 0.2 and 0.6 were selected for the final form of the test. Nine questions were thus selected for the test.

Reliability of the Test

Reliability refers to the consistency with which a measure assesses whatever it is measuring. Here the investigator prepared a parallel form for the achievement test and the two tests were
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administered in two consecutive days. The scores of the two tests were collected and correlated using Pearson’s product moment correlation coefficient. The coefficient was obtained as 0.64, which indicates the reliability of the test.

Validity of the Test

Validity concerns the extent to which an assessment actually assesses what it is supposed to be assessing. Most commonly, this is judged by the opinions of those knowledgeable persons in the subject area concerned. Content validity and empirical validity (statistical validity) are of prime importance for achievement test.

Content validity.

Content validity is determined by expert judgment. It is the degree to which a test measures the intended content area. For the purpose of the present study, the investigator discussed the test items with various experts in the field of Malayalam language and made appropriate modifications in the test items and ensured content validity. Table 4.6 shows the list of Language experts consulted in this regard.

Table 4.6. List of the consulted experts in Malayalam language

<table>
<thead>
<tr>
<th>Category</th>
<th>No. of experts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher Educators</td>
<td>M.Ed-10</td>
</tr>
<tr>
<td></td>
<td>B.Ed-25</td>
</tr>
<tr>
<td>School Practitioners</td>
<td>42</td>
</tr>
</tbody>
</table>

Empirical Validity

Empirical validity is determined by establishing relationship between scores on the prepared test and scores on some established test or criterion. The investigator selected the average scores of learners in two Malayalam test papers as criterion scores for estimating validity. The correlation
coefficient between these two was estimated and was found to be 0.81, which indicates that the test is having reasonable validity.

**Objectivity**

For ensuring objectivity, adequate supervisions with scoring stages are provided with all the test items. Besides, systematic scoring scheme was employed in the scoring procedure, which offers high objectivity of the test.

The final form of the test used for the experimental purpose was administered for a maximum score of 50 marks and duration of two hours. Adequate instructions were given in the question paper. To assist in the scoring process a scoring scheme was also prepared. The achievement in Malayalam language of the select sample of secondary school students was assessed by considering the total score on the achievement test and the data obtained were subjected to quantitative analysis. The format of achievement test is appended in the Appendix E and an English version is also appended in the Appendix F.

**Meta cognitive classroom practices**

The inextricable link of Meta cognitive strategies in the context of curriculum transaction of the present study is detailed in the succeeding section.

The curriculum transaction procedures prevalent in the school setup had been interlinked through the development of a series of lesson designs based on the Meta cognitive practices towards improving the quality of learning. In the present context, the investigator conducted a semi-structured interview with secondary school practitioners and language experts in the field of Malayalam
education with regard to the instructional practices pertaining in the classrooms. The opinions and suggestions by the select sample provide a landscape for the study. The investigator prepared three lesson designs based on the classroom practices namely, Graphic Organizer, Self Questioning and Problem Solving. The lead Meta cognitive skills like Planning, Monitoring and Evaluation have been entailed in the earmarked contexts of Malayalam language learning. Before implementing the select practices, the investigator made a holistic vision of the basic Meta cognitive strategies that can lead to more effective learning and improved performance in the learning of language. This awareness enabled the learners to perform a specific learning task with consistency and take control about what they are doing through the process of learning rather than focusing attention solely on learning the content material. The select classroom practices namely Graphic Organizer, Self Questioning and Problem Solving are described in the succeeding section.

4.7.5 Lesson Design on Graphic Organizer

A graphic organizer is a visual and graphic display that depicts the relationship between facts, terms or ideas within a learning task. These organizers activate and engage learners in the instructional process and enable them to capture and focus their attention in an exciting way. In the preset context, the investigator adopted Graphic Organizer as a classroom practice with a view to enhance student’s cognitive and Meta cognitive abilities through familiarizing the advantages of pictorial formats for processing varied modes of learning in classrooms. In order to familiarize the students with the processes embedded in the select classroom practice - Graphic
organizer - they were led through the instructional sequence suggested by Chamot and O’ Malley (1990) which is portrayed in Figure 4.7.

**PURPOSE OF CALLA**

- Focus the learner
- Improve academic language proficiency
- Motivate with content topics
- Teach learning strategies.

The five phases recursive instructional cycle of CALLA (Cognitive Academic Language Learning Approach) is Preparation, Presentation, Practice, Self-evaluation, and Expansion are illustrated in the Figure 4.8
The stages are explained below in detail specifying the responsibilities of students and teachers in each stage and the progressive channels of Meta cognitive skills through the sequential cycle of creating Graphic Organizer.

**Stage 1. Preparation stage**

The purpose of this phase was to help students to elicit their prior knowledge about the use of learning strategies and identify the strategies they are already using in order to develop their Meta cognitive awareness. Elicitation of pre requisites acts as mental hooks for lodging of new information and it is the basic building block of content and skill knowledge. The teacher explains the importance of Meta cognitive strategies and helps the students to set the goals of the learning task and time needed to accomplish the learning task.

The highlight of this stage is depicted in Figure 4.9
Stage 2. Presentation

The second stage, namely ‘presentation’ comprises of demonstrations of the particular classroom practice before the learners. Modeling and discussion, application of the practice explicitly through examples are the core features of this stage. The use of Graphic Organizer in varied learning contexts, ways for monitoring the classroom practice, orchestrated use of several Meta cognitive strategies and evaluation of effectiveness of the Meta cognitive classroom practices were illustrated through specific examples from the content material. The highlight of the stage is portrayed in Figure 4.10.

![Figure 4.10. Highlights of the ‘Presentation’ stage.](image)

Stage 3. Practice

During the third phase ‘Practice’, learners are divided into groups and are immersed in the experience with sequenced instruction. There were opportunities to practice new information and skills in a variety of ways by involving the spontaneous contribution of ideas from all members of the group. This stage envisages opportunities for students to practice using the strategy with regular classroom discourses. Practicing learning strategies, co-operating with others, practicing monitoring techniques as effective modes for creating dynamic learning environment are its features. Learners were also directed to make a conscious effort to develop varied graphic organizers in
connection with the particular language-learning context and recognize the practicability of different organizers in different learning contexts. The highlights of this stage are given in Figure 4.11.

![Figure 4.11. Highlights of ‘Practice’ stage.](image)

**Stage 4. Self Evaluation**

This phase stands out as one of the most comprehensive parts of the learning cycle and it captures the relevance of the instructional practice to be followed and its effectiveness in a contextual setting. The main set target of this phase was to provide students with opportunities to evaluate their own success and strengthen their insights through developing their Meta cognitive awareness. Debriefing discussions and sharing of their recorded learning experiences enable the learners to develop insights about the appropriateness of the select classroom practice. The major components included in this stage are shown in Figure 4.12.

![Figure 4.12. Highlights of ‘Self Evaluation’ stage.](image)
Stage 5. Expansion

This final phase really meant for the transfer of skills learned in a particular learning context to another new situation. Learners are in a position to extend the usefulness of classroom practices by applying it to new contexts and devise their own individual combinations with regard to the pictorial representations of ideas and interpretations of the select Meta cognitive classroom practice. The points inculcated in this stage is given in Figure 4.13

Concluding thoughts

Each stage of this classroom practice shed light on the strengths of highly explicit instruction in familiarizing the Meta cognitive strategies towards maximizing the intended outcome of the learning task and gradually learners can begin to assume greater responsibility in selecting and applying appropriate graphic organizers in terms of the content material. This learner centered reflective, supportive, focused and empowered instructional practice demonstrates a thoughtful plan of action and provides opportunities to interact, analyze, and interpret information and challenging contexts through the varied use of nonlinguistic representation. Opportunities for self monitoring and self evaluation enable the learners to produce valuable outcome in learning.
From this perspective, it can be concluded that using this type of pedagogic practice, we can illuminate the metacognitive skills, which are crucial for learners in building a productive metacognitive classroom environment. These pictorial representations of information show the relationships among ideas and concepts such as hierarchies or subcategories and assist students in visually organizing information and isolating important details. Research suggests that when the brain is challenged, it becomes engaged in intense activity and search for patterns and connections (Cain and Caine, 1991, 1993; Sylwester, 1995; Wolfe, 1996). Practice on developing these patterns in the form of G.Os enables the learners to interact with information and makes the thinking visible to others. Such type of enriched environment helps the students to flourish the learning process and engage their brain with intriguing and inviting intellectual challenges. The format of the lesson design on ‘Graphic Organizer’ has been appended as Appendix G.

4.7.6 Lesson Design on Self-Questioning.

The theoretical framework underlying the instructional sequence of Self Questioning highlights its ability to activate learners’ knowledge and strengthen their metacognitive awareness and helps to invoke higher order comprehension processes. This select practice namely ‘Self Questioning,’ is opted in tune with the Duke and Pearson’s Apprenticeship Model for developing questioning practices which consisted of a four phased schema orientation namely, Describing, Modeling, Scaffolding and Prompting towards empowering the learning strength of students. Verbal mediation is the active process underlying in the Self Questioning strategy. Like other metacognitive practices, Self Questioning can be taught to students, which enables them to
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generate and answer their own questions which helps to facilitate information processing. This type of generating questions helps to prompt interpretation and to probe the text more deeply. In Self Questioning, students ask questions by themselves that enhance the development of Meta cognitive skills. Teachers can guide the students with reflective questions that trigger their Meta cognition. Space for evaluation is the cornerstone of Meta cognitive practice, so that the investigator adopted the model along with a slight modification by including the phase, ‘Evaluation’. Thus, finally a five-phased Self Questioning practice was adopted for the study. The five phases are: Describing, Modeling, Scaffolding, Prompting, and Evaluating. The sequencing of the model is given in Figure 4.14.

![Figure 4.14. Apprenticeship Model – A Syntax of automatically generated self-questioning.](image)

**Stage 1. Describing.**

The initial phase of the Self Questioning practice begins by an explicit explanation about the significant and remarkable benefits incorporated in this particular mode of learning experiences. Pre attempts for Self Questioning practices, varied dimensions of questions and Meta cognitive practices are described in detail. Clarifications and thoughtful discussions from the part of the learners...
enabled the teacher to build a safe environment for proceeding the rest of the phases embedded in Self Questioning practice.

The purpose of this phase was to provide enough time for the students to reflect their accustomed learning strategies. The initial instruction begins by explaining the importance of Meta cognitive learning strategies. This paves way for making the learners aware about the notion behind the specific instructional practices based on Meta cognition and Self Questioning as a means for developing Meta cognitive skills among learners. The investigator describes the power of quality questions, which enables the learners to engage at varied and appropriate levels of cognition. In addition to that, this helps the learners to create a quality perspective towards different types of questions and promote equitable participation among them in an interactive mode. The features of this stage are highlighted in Figure 4.15.

![Figure 4.15. Highlights of ‘Describing’.](image)

**Stage 2. Modeling.**

Subsequently the investigator illustrates the classroom practice through ‘Modeling’, which gives the learners a real lesson context with a commitment to continuous improvement in learning. This carefully designed and structured pattern entails to gain a deep understanding of the procedures needed for completing the desired
learning task. Explicit instruction and observational learning are the intended outcomes of ‘Modeling’. Demonstration of the skill or strategy enhance the learning outcome of a particular task and set a standard for learners. In this stage, the investigator explicitly teaches the sequential order of making varied questions appropriate to the content. Subsequently learners make sure about the ‘plan of action’ formulated at the inception stage of this instructional practice. Learners frequently self-monitor their learning progress and record it in their work diaries. The major highlights of the stage are given in Figure 4.16.

![Figure 4.16. Highlights of ‘Modeling’](image)

**Stage 3. Scaffolding.**

The next phase ‘Scaffolding’ is intended to help the students to apply the classroom practice in a particular learning context through constructing their own questions. Scaffolding is an instructional technique where by the teacher models the desired learning strategy or task, then gradually shifts the responsibility to the students. It follows an intelligent feedback from the part of the investigator towards guiding the learners in creating a productive classroom set up and mitigates the errors committed by them. This meaningful context for leaning ensures a lively pace, demonstrates enthusiasm among the learners, and provides very effective instructional foundation for development of proper Meta cognitive skills.
Scaffolding in the present context is that stage of Self Questioning where in the learners are provided with assistance in constructing questions and given feedback on them. This teacher directed practice leads the students into productive, vibrant and dynamic discussions about the content material and it automatically encourages the wholehearted participation of the learners in the classroom. This strategy can assist less skilled discussants in understanding the learning task in a comprehensive manner. Through scaffolding, learners will become more skilled and secure in their ability to function in a welcoming and caring learning environment. After the formulation of questions related to the learning content, the teacher invites the students to present and explain the type and relevance of the questions they were formulated. This will stimulate deeper comprehension of the earmarked content material among the learners. The focal points considered in this stage are depicted in Figure 4.17.

![Figure. 4.17. Highlights of ‘Scaffolding’.

Stage 4. Prompting.

‘Prompting’ enables the students to generate questions and engages in self-monitoring with the help of prompts. The self-monitoring sheets were given by the investigator. It has also been used to stimulate self-explanation for generation of questions and build coherent understanding of the learning task. The noticeable attempt in this stage is that learners are encouraged to promote higher levels of engagement through teacher
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prompts. When they gave either incomplete or incorrect responses, teachers accepted their participation and corrected their answers more completely by gently guiding student thinking with appropriate frameworks. In the present context, the investigator made use of a ‘Q’ card which provides stems for questions towards the expected students’ performances. It enabled the investigator to help the learners individually in processing their answers and become intentional in formulating and assessing questions at all levels of cognition. Follow up questions and comments prompt the students to elaborate their answers and encourage them to think more deeply to make new connections with regard to the questions they framed. Practicing ‘wait-time’ open up exciting possibilities for the students to come up with completed answers. The effective feedback can retain the students in the class and the collaborative classroom interactions spotlight the academic purposes in a new perspective. The major highlights are given in Figure 4.18.

Figure 4.18. Highlights of ‘Prompting’

In the present context, the investigator divides the students and asks them to write at least five questions about the specified part of the content and discuss the questions and answers with the teammates. This will allow the students to get a clear understanding of the content and the practices they followed. The observational checklist developed by the investigator also enabled to focus on the different
dimension of self-questioning practices and notice the positive attitude of students through framing and presenting various types of questions related to the content material.

Stage. 5 Evaluating.

The final phase of the Self Questioning practice, namely ‘Evaluating’ enriches learners’ self-monitoring capabilities and changes the classroom dramatically through the active participation of the students. Evaluation and follow up comments reinforce student understanding and long-term retention of the schema modifiability. The discussion associated with evaluation phase intended to facilitate and sustain student’s interest rather than evaluate their answers. Cognitive discussions make them alert about the product of learning and Meta cognitive discussions enable them to give thoughtful attention to the process of learning and serve as a guide for judging the worthiness of the classroom practices carried out in the classroom. Verbal feedback derived from the learners provides ample evidence for the processing of learning in a deep level. The highlights of the stage are given in Figure 4.19.

During this stage, the teacher assisted the students to discuss their learning experiences and revisited the formulated learning goals. As a part of the commencement of authentic self assessment the
investigator made them aware of the usual assessment criteria and gave proper directions to develop a Student Generated Rubric. After codification of the set rubric they were given chances to self assess the assigned task. Learners feel confident in the task of assessing their work and are more engaged, accountable and responsible when they are given a voice and choice in their learning through the creation of Student Generated Rubric.

Concluding thoughts

The meta cognitive classroom practice, namely ‘Self Questioning’ exposed to the experimental group admits the efficacy of the practice towards attaining a better outcome in the learning of Malayalam language and producing a higher quality in the learning process at varied levels. Coaching to assist students in framing, structuring, soliciting and reading good questions mainly intended to focus on the improvement of classroom questioning practices and learners have acquired a number of benefits from them. The investigator felt an added benefit that the questioning practice enables the learners to build relationships among them and allow expression of affect through becoming better listeners and more present for another person towards taking them to new heights. Properly sequenced questions allow the learners to clarify and share learning intentions towards building the criteria for success. Independent level of verbal instructions by consciously using conversations and instructional dialogue help them to become competent as question framers in the process of learning. The investigator felt that this questioning process, classroom discussions and sharing of thoughts help them to internalize quality practices in questioning and the appropriate wait time allows them to make thoughtful responses towards attaining improvement in learning.
Even though this type of questioning practices are new spheres to some students, most of the students enjoyed and benefited from generating their own questions. The Meta cognitive skills typically practiced in each phase of the lesson and recording their views on a work diary keep them in a track and enable them to enrich their capabilities and potentialities and there by foster the needed Meta cognitive skills in completing a learning task. The format of the lesson design on ‘Self Questioning’ is appended as Appendix H.

4.7.7 Lesson Design on problem solving.

Problem solving needs reflective action and sequential processes from the part of the learners, which involve active, persistent consideration of knowledge, formulation of hypotheses, reasoning and testing them with available evidences. It provides a way of observing and analyzing rather than relying on relatively infrequent observations by others. It also reflects the conviction that learners study and learn best when they are seeking the practical relevance of their learning to the varied aspects of their lives. A methodical, formal problem solving sequence proposed by Polya (1945) include four approaches namely, Pose the problem, propose the method, find a solution and look back. The key skill of problem solving is directly concerned with higher order questioning rather than factual recall questioning. Development of group identity and inter personal relationships are the demanding outcomes of problem solving. Meta cognitive processes in problem solving include (1) Assessing the requirements of the problem (2) Constructing a solution plan (3) Selecting an appropriate solution strategy (4) Monitoring progress towards the goal and (5) Evaluating the plan of action.
For the purpose of the study a combination of Three part self-coaching routine (Montague & Dietz 2009) and TASC problem solving wheel (Wallance, 2001) were adopted. ‘Say-Ask-Check’ Meta cognitive prompts (three parts self-coaching routine) tied to the TASC problems solving wheel depicts the clear picture of Meta cognition in problem solving process. The phased implementation of the select classroom practice, Problem Solving is detailed in the following section.

**Stage 1. Problem Identification.**

Identification of the problem is the crucial element because teachers need to focus on the pertaining issue, gather, and organize the information that the learners already know about the issue. This enables the learners to formulate a holistic picture by combining bits of information already they have. In the present study, the investigator arranged the students in small groups and gave each group a copy of an editorial from the Malayalam Daily. The investigator trained the students to ask sample Meta cognitive prompts to make sure about the processes they are doing in order to make the thinking visible. The highlights of the Problem Identification stage are depicted in Figure 4.20.

<table>
<thead>
<tr>
<th>STAGE</th>
<th>PROCESSES INVOLVED</th>
<th>META COGNITIVE SAY-ASK-CHECK PROMPTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Identification</td>
<td>The student reads and studies the problem carefully before proceeding (<em>Self-Instruction</em>) The student makes questions with regard to the problem they confronted (<em>Self Question</em>) and proceed only the problem is understood (<em>Self-Monitor</em>).</td>
<td><em>Say:</em> I read the problem carefully and will re-read it if I don’t understand. <em>Ask:</em> ‘Do I fully understand it?’ <em>Check:</em> I understand the problem and will move forward’.</td>
</tr>
</tbody>
</table>

*Figure. 4.20. Highlights of ‘Problem Identification’.*

Meta cognitive prompts allow the learner to identify the pertaining problem in a clear manner. Students were asked to assess
the major components in the distributed editorial and monitor their understanding with respect to the pathways of writing an editorial.

**Stage 2. Defining the problem.**

Defining the problem is characterized by ensuring learner’s active involvement in the learning task. In order to demonstrate clear understanding of the problem, the students restated the problem in their own words and they were reaching in a position to highlight the key words and phrases that relate to the problem. This stage would focus on certain dimensions, which is depicted in Figure 4.21.

<table>
<thead>
<tr>
<th>STAGE</th>
<th>PROCESSES INVOLVED</th>
<th>META COGNITIVE SAY-ASK-CHECK PROMPTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defining the Problem</td>
<td>The students restates the problem in order to demonstrate a clear understanding <em>(Self Instruction).</em> The student highlights the key words and ‘asking’ some questions by himself <em>(Self-Question)</em> in order to make clarity on the problem and concludes by self monitoring or checking the successful completion of this step <em>(Self-Monitor).</em></td>
<td>Say: ‘I highlighted the key words and phrases related to the problem.’ <em>Ask:</em> ‘Did I highlight the most important ideas pertinent in the problem?’ <em>Check:</em> ‘I checked the prominent issues embedded in the problem.’</td>
</tr>
</tbody>
</table>

**Figure. 4.21. Highlights of ‘Defining the problem’**.

The learning experiences provided in this stage offer the students rich opportunities for exploring the concepts and identifying the organizational format of information embedded in an editorial. The instructional practitioner provided turns in each group for discussions about the formats and conceptual issues in the editorial and chances for substantiating their ideas with regard to the problem at hand.

**Stage 3. Formulation of a strategy**

Preparation of an Editorial is the main task of the third stage. The Investigator asked the students to identify the key issue from the
learned unit in the prescribed text and brainstorm with the class a list of what they know about the topic. After clarifying all the listed items in a brief manner, the investigator assigned each item for each group for giving detailed description with regard to the particular issue. Mutual exchange of ideas assisted the learners to extend their thought patterns in a sequential way. They highlighted the main theme, sub themes, sequential processes included in the formation of editorial, space for substantiating their viewpoints, concluding thoughts and the like.

When the students often have trouble with the preparation of the assigned task, teacher made them empowered by helping to think divergently and link ideas coherently. In addition to that, the investigator instructed the groups to read the text and use additional resource materials to look for information that will expand and extend their basic knowledge. Following the timely assistance by the teacher, students reached in a position to build an appropriate structure needed for creating an editorial, which is the intended outcome of this classroom practice. The features highlighted in this stage are shown in Figure 4.22.

<table>
<thead>
<tr>
<th>STAGE</th>
<th>PROCESSES INVOLVED</th>
<th>META COGNITIVE SAY-ASK-CHECK PROMPTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formulation of a strategy</td>
<td>The students generate a plan to solve the problem by themselves through the formulation of a strategy <em>(Self Instruction)</em>. Subsequently, the students engaged in asking self questions with regard to the sequential processes included in the completion of the particular learning task <em>(Self Question)</em>. The students decide to develop an Editorial and check the components needed for creating a structured format of the same <em>(Self Monitor)</em>.</td>
<td><em>Say:</em> 'I have made a pattern to depict the problem.' <em>Ask:</em> 'What is the first step of the task?' and 'What is the next step?' <em>Check:</em> 'I carried out all the steps needed for framing an appropriate structure of an editorial.'</td>
</tr>
</tbody>
</table>

Figure 4.22. Highlights of ‘Formulation of strategy’.
Stage 4. Implementation.

The actual execution of the task takes place in this phase. After gathering the needed information, the investigator directed the students to write an editorial focusing on the varied views elicited from the members. The investigator through the administration of the observational checklist reports ways of presentation of the issue, style of language, pattern of writing and the like. The main features of this stage are given in Figure 4.23.

<table>
<thead>
<tr>
<th>STAGE</th>
<th>PROCESSES INVOLVED</th>
<th>META COGNITIVE SAY-ASK-CHECK PROMPTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation</td>
<td>With the assistance of the teacher, students self instruct by saying or stating the purpose of this stage <em>(Self Instruction).</em> It follows by a self questioning phase which intends to make clarity about the execution stage <em>(Self Question).</em> The students self checked the ideas emerged from the team members and focused on presenting them in an orderly format <em>(Self Monitor).</em></td>
<td>Say: ‘My strategy has the right steps to solve the problem’. <em>Ask:</em> Did I incorporate the main and subthemes related to the problem in a codified manner? <em>Check:</em> I incorporate all the relevant themes.</td>
</tr>
</tbody>
</table>

Figure 4.23. Highlights of ‘Implementation’.

In this phase, students were directed to implement the proposed learning task by incorporating the fundamentals and constituent parts of the editorial. They were giving due weightage to the structural format, linguistic components and comprehensive analysis and gradation to be followed for writing an editorial. Investigator gave adequate feedback and instilled motivation among the learners which are the needed requirement for transfer of learning.

Stage 5. Evaluation and Reflection

This phase means evaluating and reflecting students’ achievement and progress towards the learning task. To monitor effectively, teacher
needs to interact verbally with students. For this study, investigator invited the students in each group and allowed the leader to read aloud the product they constructed and explain the format used. They also reviewed the format of their product and checked the entire process of implementation. This enables them to reflect their own learning task, crystallize their learning and organize the ideas in a sequential manner. Analysis of the content, analysis of the strategy they used to perform the learning task, ways for improving the problem solving ability – all these are the questions to be answered by the students. The main features of this stage are given in Figure 4.24.

<table>
<thead>
<tr>
<th>STAGE</th>
<th>PROCESSES INVOLVED</th>
<th>META COGNITIVE SAY-ASK-CHECK PROMPTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation and Reflection</td>
<td>The students self instruct by stating the purpose of this reflective practice (Self Instruction) and engaged in framing certain questions with respect to the worthiness of this practice (Self Question). The students conclude the learning task by monitoring the format of the editorial they prepared and evaluate their learning outcome (Self Monitor).</td>
<td>Say: ‘I checked the outcome of the learning task and its structural format’. Ask: ‘Did I go through each step in a productive manner’? Check: The students self check the appropriateness of the assigned task and the differentiated pathways towards reaching a position to depict a social issue in a sophisticated mode.</td>
</tr>
</tbody>
</table>

Figure 4.24. Highlights of ‘Evaluation and Reflection’.

Besides discussing about the cognitive and Meta cognitive dimensions, students were directed to self evaluate a learning task by using a rubric named as Student Generated Rubric. This gave ample opportunities for the learners to become competent enough to design a rubric and evaluate the assigned task with the stipulated criteria.
Concluding thoughts

The processes embedded in the contextual problem solving made the learning meaningful to the students and the Meta cognitive prompts embedded in each phase of the Problem solving section empowered them to connect the ideas with their existing knowledge. They are more likely to be working cooperatively in small groups as they shape and reformulate their conceptions and practicing skills through engaging hands on activities rather than sitting silently at their seats. This rich environment fosters a state of relaxed alertness in learning which enables the minds to become engaged in problem solving. The essential elements of brain compatible classrooms require students to engage in goal setting, self-monitoring and evaluation of the learning process. The highly participative and interactive instructional climate allowed them to strengthen their motivation towards becoming better problem solvers. The format of the lesson design on ‘Problem Solving’ is appended as Appendix I.

4.7.8 Observational checklist: An Assessment Window for Monitoring.

Observational checklist is a strategy to monitor specific skills, behaviours and dispositions of individual students or group of students in the class and it is a developing field with emerging methodologies. Observation helps to assess students’ academic performance and classroom related behaviors (Salend, 2008, Overton, 2009) and acts as a catalyst for monitoring the learning progress of students in particular language learning set up. It includes noticing, marking and recording student behavior in order to distinguish something from its surroundings. This type of academic enabler helps to measure students’ ability to
manage their own learning (Diperna, 2006) and it provides rich information pertaining the patterns of the classroom practice.

The collection of data through such observational techniques enables to unlock the information potential from multiple perspectives and productive learning environments. It is a clear method of recording of what has been observed and can easy to administer in classroom settings. Anecdotal records, checklists, video-audio recordings or photos may be used to formalize and document the observations made. In this study, the investigator made use of Observational Checklists for the select three Meta cognitive classroom practices. The word ‘window’ captures both the idea that an observer looks through at a scene and observes the students during the varied instructional phases and the idea that any type of assessment technique is limited in scope. (Serafini; 2010) Like windows, these checklists help to find a bit of reflection about the performance of learners at various levels.

**Preparation of observational checklists (Draft form)**

Before constructing the checklist, the investigator reviewed the literature and examined the available checklist that have been already prepared and used by other researchers in similar fields. Seeking discussions from the experts in the field of education, reviewing the theoretical perspectives and consultation with the supervising teacher, the investigator drafted the specific skills expects from the learners due to the impact of the select Meta cognitive classroom practices namely,’ Graphic Organizer’ ‘Self Questioning’ and ‘Problem Solving’.

**Tryout of the draft checklists**

The investigator created draft checklists including the anticipatory skills with regard to the select classroom practices and it was modified
after collecting suggestions from the experts. From their suggestions, it was found that there were little duplication for some items and those items were discarded. The final forms of the checklists were prepared after necessary modifications in the preliminary form.

Procedures Adopted

The investigator developed the final checklists and administered it amidst the process of curriculum transaction in Malayalam language. While the learners are actively engaged in the instructional activities the investigator monitored their behaviors and level of performances in each group by using this academic enabler. Subsequently the investigator reported their level of performance on a three-point scale namely, Fair, Good and Poor, by putting a mark against each criterion evaluated. This enabled the researcher to focus on the anticipatory skills needed for completing the learning task and can evaluate the quality of the interactions and performances among the learners. As the instruction progresses, the observer recorded the comments of individual students with regard to the particular Meta cognitive classroom practices. These types of reflective elements are acted as the thoughtful interludes in the process of learning. Once the observation has been completed, the investigator provided a learning space for discussions in this regard. This may offer insight to them and will develop their understanding with regard to the skills and competencies needed for completing a learning task with confidence.

Validity of the Observational checklists

Validity refers to the appropriateness of a tool and the correctness of the data collected. Content validity has been established for the Observational Checklists. The items in the checklists were
decided based on the intensified reading about the select classroom practice and the web of valuable points collected from the experts in the field of Malayalam language learning. Thus it can be reasonably assumed that the observational checklists meant to assess the skills possessed by the students due to the implementation of meta cognitive classroom practices, possesses satisfactory validity.

**Scoring procedure of the Observational Checklists**

To quantify the data obtained through the Observational Checklist, the responses are counted and converted into percentages. The Observational Checklists on Graphic Organizer, Self Questioning and Problem Solving were appended as Appendix J, Appendix k, and Appendix L.

**4.7.9 Collection of Linguistic Discourses.**

In order to intensify the worthiness of select Meta cognitive classroom practices, the investigator adopted Critical Incident Technique (CIT), which is a well-proven qualitative research tool that offers a practical systematic approach to collecting and analyzing information about activities and unearths the experiences that learners met in the classroom. The creator of CIT, John Flanagan described it as,’ A set of procedures for collecting direct observations of human behavior in such a way as to facilitate their potential usefulness in solving practical problems and developing broad psychological principles’ (Flanagan, 1954, p.327) As the name suggests, CIT involves the study of critical incidents –or significant instances of a specific activity- as experienced or observed by the participants.
Methodology

Collection of critical incidents

Critical incidents are narrative descriptions of important events that occur in a particular situation and are effective vehicle for understanding the personal. The dramatic impact of such an intervention that may not be apparent through quantitative methods of data collection (Marreli et al 2005). These primary focus of data collection in appreciative inquiry captures the actual voice of the learner ‘verbatim’ and has an application in knowledge sharing processes and can be collected through different sources include focus groups, individual interviews, surveys, performance records, learning logs, work diaries and the like. In the present study, the investigator directed the intervention group to record the incidents of spontaneous experiences of success or failures as they occur while the curriculum transaction takes place. Learners wrote the incidents or experiences in a diary that is kept daily in a systematic manner in order to identify their performance improvement. After the completion of the intervention procedure, the investigator categorized the narratives into themes and demarcated the critical areas within the learning environments. Some of the select excerpts from the narratives are presented here.

1) “I enjoyed the way in which the learning process are conducted and feel more comfortable in my own learning.”

2) I really get satisfaction from my learning and enjoyed the systematic and structured format of this classroom practice.”

3) I feel confidence in my study and like to transfer these skills in other disciplines.”
4) I gained a better understanding of how to proceed a learning task by utilizing the interaction of my peers.

5) The processes of planning, monitoring and evaluating assist me in regulating the learning process in an appropriate set up.

The detailed version of the results is attached in the analysis chapter. The highlighted points with regard to the experiences of the learners are appended as Appendix M.

4.7.10 Strategy Evaluation Proforma

An evaluation proforma is a measuring tool with a set of statements that require the respondents to state their opinions regarding a phenomena or an educational event in an authentic way. To supplement the quantitative data regarding the effectiveness of meta cognitive classroom practices for improving the academic performance of Malayalam language learning, the investigator has adopted a qualitative research trend and for that a tool namely, an evaluation Performa was prepared and validated for the students exposed to the select meta cognitive classroom practices. The analysis of the data obtained through administering the strategy evaluation proforma shed light on the explicit change in their achievement than the students exposed to the activity oriented modes of curriculum transaction. Evaluation proformas based on classroom practices on Graphic Organizer, Self Questioning and Problem Solving, which comprises of 10 statements were prepared to collect students’ independent views about the select Meta cognitive designs. The items were concerned with the noteworthy features of the select classroom practices, which are sufficient to throw deeper insight into the effect of select practices for developing a Meta cognitive climate.
in the classrooms. The prepared proformas were discussed and validated with the experts in the field of language education and their feedback strongly influenced in the final design. Considering the modifications and suggestions pointed out by them, the investigator finalized the proformas and was administered to the students who were exposed to the particular experimental treatment. The final form of evaluation proforma for each select Meta cognitive practice have been appended as Appendices N, O and P. The data collected through these proforma was analyzed qualitatively for getting an in-depth vision about the views of students with regard to the select Meta cognitive classroom practices.

4.711 Student Generated Rubric -Pursuit of Excellence in learning task.

Rubrics are perceived as an appropriate tool for assessment for learning and for improving the teaching and learning in a school based situation (Andrade& Boulay,2003). Student generated Rubric (SGR) is a document that articulates the expectations from learners for a performance task by listing the criteria and describing levels of quality from grade 4 to grade 1. This type of self assessment is a part of self regulated leaning strategies and educational psychology considers that’ self regulated learning’ is an important perspective on academic learning. It is a proven practical model for directly involving students in the assessment process and it helps them to internalize learning goals and in turn increase their learning and motivation. It embodies self-observation, self-judgment and self reaction. According to Kay, Li and Fekete (2007) self assessment can strengthen students’ Meta cognitive skills so that they become more aware of useful learning strategies of ‘learning how to learn’. In the present study, the
investigator adopted the following multistep approach as proposed by Deepka (2007) for creating Student Generated Rubric.

- Describe the performance task and its purpose to students.
- Students develop Evaluation criteria
- Students create descriptors for level 4
- Teacher scaffolds them to create descriptors for level 1-3
- Teacher completes and distributes the rubric

In the present context of Malayalam language learning the investigator assigned the learners to write a travelogue and offer opportunities for them to self assess their work with a standard format. For this purpose, learners are directed to formulate certain frameworks for developing a set of criteria related to the theme. The deep understanding of the diversified criteria towards producing a travelogue accompanied by proper categorization of grading scheme. It gives students more control of their learning and makes evaluation feel less punitive and it provides an important learning experience in itself (P13). Subsequently students create appropriate levels of quality-descriptors – for the level (4) category of ‘Excellence’. The next stage is to create the remaining descriptors, from 1 to 3 levels. After completing the rubric, it is distributed to the students for making self-judgments. This process motivates them to become thoughtful judges of the learning task and they strive to perform and maintain a deeper engagement in the learning process.

Theoretical constructs underlying student generated Rubrics states the notion that assessment is not something that is done separately and apart from instruction, it must be an integral part of the learning process. This helps to promote Meta cognition among
learners. SGR enables to gain a deeper comprehension into the purpose and depth of students’ own understanding and demonstrates a new level of pride in their accomplishments. A consecutive interchange between participants’ opinions with regard to the development of criteria initiates identifying the benchmarks and accepting responsibility for fulfilling an assigned role. These initial discourses provide them an opportunity for description of the levels of performance needed for assessing a learning task as well as the performance indicators which leads to clear and consistent target for students. Involving students in generating and using criteria for self-assessment helps them get their minds around important elements of quality and use that knowledge to improve their own performance in learning.

The detailed description of the qualitative analysis on Student Generated Rubric is given in the Analysis chapter.

4.8 Channelization of investigation in the procedural mode

The focus of the present study was to find out the effectiveness of learning styles and Meta cognition upon the learning of Malayalam language at secondary level. As a preliminary step towards this task, the investigator tries to identify the prevailing practices and the challenges as well as the advisable frameworks for the promotion of meta cognitive skills while the curriculum transaction of Malayalam Language at secondary level. This tiled a way for getting an insight into the contemporary trends with regard to the Meta cognitive practices followed in various institutions selected for the study. An interview with a select sample of experts in Malayalam Language and school practitioners at various levels paved way for collecting valuable suggestions in this regard.
Subsequently a learning style inventory was administered to identify the learning styles of the total sample of secondary school students selected for the study. Based on their sensory modalities, they were classified into three learning style groups namely, Visual, Auditory and Kinesthetic. For getting a deep vision about their Meta cognitive awareness, a self-assessment rubric was administered on the select sample of the study. The self-assessment indicates a set degree of deficiency among learners with regard to the awareness on the components of Meta cognition.

A sample of 331 secondary school students from three districts of Kerala (Pathanamthitta, Alappuzha and Kottayam) was selected for the study. Among them 250 were treated as experimental group (E1, E2 and E3) and 81 were treated as control group (E4). An achievement test on Malayalam Language was administered to the select sample. The classification of the experimental and control group was given in the order shown below.

Group: 1 Experimental treatment (Graphic Organizer)
Group: 2 Experimental treatment (Self Questioning)
Group: 3 Experimental treatment (Problem Solving)
Group: 4 Control treatment (Activity oriented method)

Prior sanction was sought from the concerned authorities for conducting the experimental study.

For the experimental phase of the study, pre test post test non-equivalent group design was adopted to assess the effectiveness of the select Meta cognitive classroom practices on improving the academic achievement and strengthening the Meta cognitive awareness of students at secondary level. The selected experimental and control
Methodology

A group consisted of students having varied learning preferences namely Visual, Auditory and Kinesthetic. The experimental groups (E1, E2 and E3) comprising of three learning styles were taught using the select Meta cognitive classroom practices namely Graphic Organizer, Self Questioning and Problem Solving respectively and the control group comprising of three learning styles was taught through the present activity oriented modes of curriculum transaction. As a monitoring devise, Observational Checklists were also employed for assessing their performance at varied levels. The quantitative analysis was complemented through the administration of Strategy Evaluation Proforma, Collection of Linguistic Discourses and Student Generated Rubric. The Meta cognitive classroom practices not only motivated them to learn, but gave a proper direction to their learning and they have become lively participants throughout the process of curriculum transaction. The intellectual processes embedded in the Meta cognitive practices made learning meaningful and effected a hike in their confidence level. The experiences gathered from the linguistic discourses of learners exhibited the need for shifting product-oriented approach to process oriented approach. The discussions emerged from the participatory process reveals the necessity for designing Meta cognitive classroom practices with a wider content of learning in mind. The re-administration of the self assessment rubric on Meta cognitive awareness added the worthiness of the select components of Meta cognition namely, Planning, Monitoring and Evaluating. A test on academic achievement in Malayalam and a self assessment on Meta cognitive awareness were administered as pre test and post test. The scores procured through the pre test and post test were analyzed quantitatively to ascertain the effectiveness of select Meta cognitive practices in improving the academic achievement and strengthening
the meta cognitive awareness of Malayalam language learners at secondary school level.

4.9 Statistical procedures Resorted

In the present study, the investigator made use of the following statistical procedures to codify the results and reaching the well found conclusions.

- Descriptive statistics
- ANOVA
- ANCOVA
- Estimation of Adjusted Means
- Percentage Analysis
- LSD Test

The analysis and interpretations of the data thus collected through these analytical supports and the techniques are given in the succeeding chapter.

.....EOTA.....