Chapter 3
Research Methodology

3.0 Introduction

This chapter begins with the presentation of the research questions followed by an explanation of the terms involved and the assumptions underlying them. Beginning with an overview of various phases of the study, it proceeds to a detailed description of the Preliminary study and the Main study. The Preliminary study describes the process of finding the schools, deciding on the target group, and interacting with the students and their teachers to ascertain thinking and language abilities. The Main study includes the discussion of the principles observed in teaching thinking, the description of the day-wise classroom procedures in the intervention process, and the tools used for the analysis of the data.

It should be noted that skills and dispositions mentioned here would mean thinking skills and thinking dispositions. Wherever there is a discussion of tasks, reference is made to the respective appendices to provide the necessary context for the discussion.

3.1 Research questions

The primary purpose of this study is to seek answers to the questions of how thinking skills and dispositions can be taught in the ESL curriculum: and whether such instruction improves English language abilities. It is hypothesized here that teaching thinking in the ESL curriculum inevitably involves the use of language at a deeper cognitive level, and thus facilitates the development of language abilities. Therefore, the study is guided by two research questions:

1. How can thinking skills and dispositions be taught as a distinct component in the ESL curriculum?
2. How will the teaching of thinking skills and dispositions facilitate language learning?
The concept of thinking needs to be explicated before proceeding to other aspects of the questions. In chapter 2, a number of definitions of thinking were reviewed to reveal the lack of consensus on what constitutes thinking. Further, a few, among many, popular frameworks for thinking were reviewed in the same chapter to demonstrate their limitations in terms of their comprehensiveness. This lacuna necessitated the delineation of the skills and dispositions related to thinking.

The relevance and prominence of such listing of the skills and dispositions is rooted in the fact that language teachers' awareness levels of thinking skills are very low (Waters, 2006). For understanding the term ‘thinking’ as far as this research is concerned, reference needs to be made to the list of thinking skills and dispositions provided in Chapter 2 (See figure 2.3 and table 2.1).

The term distinct component in the research question is of great importance. Various approaches to teaching thinking were set forth in the previous chapter. Each approach has some features that are unique and some features that are common to all the approaches. The notion of distinct component, as conceived in this study, assumes some of the characteristics of those approaches; yet, it has marked features, which are described below.

- **Thinking** is taught explicitly and students need to be informed of the thinking skills or dispositions that are taken up for teaching.
- The skills and dispositions are presented as the objective(s) of the lesson.
- Though listening, speaking, reading and writing are involved in the teaching of thinking skills and dispositions, the language repertoire required to articulate those skills and dispositions should be taught to students implicitly, i.e., thinking skills and dispositions appear in the foreground and the language use takes place at a cognitive level with a cognitive end. It might be misconceived here that language is neglected or given secondary importance. In fact, language labels are the carriers of thought and using language to develop thinking skills can become a stronger motivational force for students to learn language. Further, on carefully understanding the inter-functional relationship between language and thought, as affirmed by psychologists such as Vygotsky and Piaget, there is little ground for the idea of developing thinking skills without using language.
Another immediate connotation of distinct is separate. Teaching thinking in this study is not recommended to be a stand-alone course. In other words, it should not be separated from language teaching. Rather, it should take place consistently across years of school education as part of the ESL curriculum.

It should be noted that an infusion approach is not suggested here. In infusion approaches, the lessons are modified completely to realize thinking skills and dispositions but it is recommended here that the existing pattern of the language course books need not be changed or restructured completely for the inclusion of thinking skills and dispositions. One strong reason that works against the idea of restructuring is the lack of one-to-one correspondence between language skills and thinking skills. For instance, to articulate similarities and differences, there are various words and phrases that can express the same notion.

Therefore, the teaching of thinking suggested here is neither a one-off course nor a replacement of the existing pattern of language course books through restructuring the lessons completely. Instead, it needs to be a supplement to every existing unit/lesson taking a cue from the theme or topic of the unit/lesson.

Thus, English language teachers might consider another component in the ESL curriculum, i.e., Thinking (T) in addition to LSRW (Listening, Speaking, Reading and Writing).

However, as for the current study, the lessons on thinking skills (details are discussed in the following sections) do not have an explicit connection with the lessons in the existing course book used by the target group though the lessons are prepared keeping in view the linguistic and cognitive complexity in the existing course book. The reasons for developing lessons independent of the course book are given below:

1) Given the exploratory nature of the study, the language and thinking abilities of the students guided the research process. As a result, the lessons need to be prepared based on their abilities. Furthermore, the problems that arise in the teaching of a lesson during the course of the study should be addressed in the subsequent lessons.
2) If the lessons are prepared independently, it is possible to sequence the thinking skills and dispositions in such a way that cumulative learning is possible. This can facilitate more effective and meaningful discussion in the classroom.

3) Based on various established theoretical frameworks for thinking, a list of thinking skills and dispositions were given in chapter 2 (see figure 2.3 & table 2.1). An attempt was made to cover all of them, at least a few from each dimension and category. This attempt was prompted by a need to investigate the progression or sequence of thinking skills in the course of teaching them.

4) Moreover, to observe the connection between language abilities and thinking skills and dispositions, lessons on thinking skills in the current study were prepared independent of the lessons in the course book.

The aim of the second research question was to understand the impact of teaching thinking on language abilities. In the actual intervention, though all the four skills of the language were involved, writing was considered to be the evidential representation of the language skills. Hence, the written tasks of the students were analyzed to document the changes in their improvement with regard to thinking and language abilities.

3.2 Assumptions

The research study is based on the following assumptions.

1) **All the students have the ability to think.** Teaching thinking docs not mean, in any sense, that students do not have thinking abilities. It is strongly believed that these inherent abilities can be improved through conscious effort.

2) **Thinking skills and dispositions can be taught and learnt.** Owing to the fact that thinking is abstract, there might be a misconception that thinking cannot be taught. Ironically, this abstract nature forms the strong justification for helping students gain control over their thinking processes. Over the years, cognitive psychologists have discussed many cognitive skills which are important in successfully dealing with situations in one's personal and professional life. In addition, a number of studies, which were discussed in chapter 2, support the view that thinking
can be taught and learnt. Hence, the study rests on the presumption that thinking skills can be taught and learnt.

3) **Teaching thinking in the ESL curriculum can lead to transfer to other domains of knowledge.** When we agree to the notion that language is central to the education process; and enhancement of language proficiency helps in learning other subjects, it is easy to discern the logic that language and thought are interfunctional and teaching thinking skills and dispositions in the ESL curriculum can lead to transfer to subject domains too.

### 3.3 An overview of the research procedure

The research questions mentioned above required a preliminary study to assess and document the current thinking abilities of the target group. This was followed by the main study, i.e. the intervention programme for teaching thinking. The following are the steps in the research process (See Fig. 3.1):

The phases of the research process depicted in Fig. 3.1 are explained briefly before we have a comprehensive discussion and rationale for each activity in the study.

1. **Selection of the target group; Interaction with the students and the teachers**
   
The research process began with the selection of the schools and the target group followed by discussions with the students to gain acquaintance with them and to examine the environment in which they were studying. Interactions with the teachers also took place to understand their views about teaching thinking in the ESL curriculum.

2. **Preliminary study Phase 1 and 2**
   
   At this stage, the students were given a reading passage to stimulate their thinking skills. The written responses were collected and analyzed. In phase 2, two writing tasks were given to the students to understand their thinking and language abilities.
3. Preliminary study Phase 3 (Pre-Intervention Assessment)

Guided by the findings from phases 1 and 2, the students were given a comprehensive assessment that aimed at assessing their current levels of thinking and language.

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**Fig. 3.1 Overview of the Research Procedure**

- **Target Group selection, Interaction with the students and teachers of School A and B**
- **Phase 1 (Time: 2 hours)**
  A reading passage with questions was given to ascertain students' thinking and language abilities
- **Phase 2 (Time: 3 hours)**
  Two writing tasks were given to understand their current level of thinking and writing abilities
- **Phase 3 (Time: 3 hours)**
  Administering Pre-Intervention Assessment to ascertain the thinking skills to be taken up for Intervention
- **Teaching Thinking (Time: 31 hours)**
  Teaching thinking skills and dispositions captured in 14 lessons
- **Assignment (Time: 2 ½ hours)**
  10 tasks representative of all the lessons in the intervention
- **Post Intervention (Time: 3 hours)**
  Post-Intervention Assessment to evaluate the effectiveness of the research study
- **Analysis and Interpretation of Results**
  Analysis of the data collected from Pre-Intervention, Intervention, Assignment, and Post-intervention
4. **Main Study**

The main study involved the following.

- **Intervention**
  
  Based on the findings from the Pre-Intervention Assessment, lessons were designed for teaching thinking skills and dispositions.

- **Assignment**
  
  After the intervention process, 10 tasks were given to the students. These tasks were designed in such a way that they form the representative sample of the learning processes in the intervention lessons.

- **Post-Intervention Assessment**
  
  To assess the development of the students in terms of their thinking and language abilities, Post-Intervention Assessment was conducted.

- **Analysis and Interpretation of Results**
  
  The written performances of the students were collected and analyzed using the rubrics specially designed for the tasks in the study.

Before we set out for the detailed discussion of the phases in the current study, it is necessary to understand the rationale behind choosing the target group of students and to provide a student profile.

3.4 **Target group**

Government schools were considered for conducting the preliminary study. These schools are run by the Government of Andhra Pradesh. The rationale for choosing schools in the government sector is discussed below:

1) According to the educational statistics of Andhra Pradesh presented by the Commissioner and Director of School Education, Hyderabad (2012), of the 1.33,90,924 school population, nearly 80 lakh students were studying in Government schools, which formed nearly 60% of the total student population in primary and secondary education. At a time when there are many corporate schools, it assumes significance to take into consideration the fact that the contribution of the government sector to school education in Andhra Pradesh is predominant. All these schools follow
the same academic processes and use a common English course book with A.P. state syllabus. On the contrary, the schools run by private managements use a number of different course books, activities, etc., as a result of which the students are along varying paths of development. Therefore, government schools were considered to be representative samples to increase the generalizability of the study.

2) Cognitive ability is intensely complex and it is generally determined by many factors. Socioeconomic status is also found to influence a child’s cognitive ability. Such influence can persist through various stages of child development.

Jensen (2009) presents the summary of various studies that indicated the influence of socioeconomic status of children on their cognitive development. One of the studies assessed the working memory and cognitive control of middle school children. The study revealed that there are significant disparities between lower-income and higher-income students in five neurocognitive systems—the prefrontal/executive, the left perisylvian/language, the medial temporal/memory, and the parietal/spatial cognition, and the occipitotemporal/visual cognition. These five systems form an overarching operating system which enables students “to pay attention, work hard, process and sequence content, and think critically” (p. 32).

In another study, the brains of low-SES (Socio-Economic Status) and high-SES were scanned. Figure 3.2 demonstrates the dramatic differences between the students’ brains of low-SES and those of high-SES with regard to various aspects such as language. It can be seen that the students from low-SES (Socioeconomic status) performed low on various cognitive tasks. Among all of the factors, students from low-SES showed lower abilities in language more than in other factors (the effect size being nearly 1.0).

Since students belonging to the poor socioeconomic background need to compete with the students from high-income groups in the cut-throat competition that exists today, the present study assumes significance in that the intervention could prove effective in improving their cognitive abilities. Hence, the students from low-income groups were chosen for the study.
Fig. 3.2 How do the brains of children from low-SES and high-SES differ?

Effect-size differences are measured in standard deviations of separation between low- and middle-income 5-year-olds.

3) From the studies mentioned above, it is easily discernible that the language abilities of children from low economic background are low. As a result, it would be possible to investigate the effect of teaching thinking on the language abilities. In other words, language development could be traced with more precision in the case of students with low language proficiency levels.

The above three points form the justification for choosing the target group from government schools.

As far as the student level was concerned, students of class IX were chosen so that a range of thinking skills could be included in the intervention. With regard to the medium of instruction, regional medium students were preferred for the reason that their language development could be investigated with more precision. As for the number, it was decided to consider 30 to 35 students to form the representative sample of the study. However, the number of students studying in class IX is not more than 15 in the schools considered for the study. Hence, it was necessary for the intervention to be conducted in three schools.

Three schools in the city of Hyderabad, Andhra Pradesh were approached for conducting the preliminary study. After the school authorities permitted the research project, the environment in the schools was observed. All the three schools shared similar features, as described below.
These schools are located next to busy streets in the old city of Hyderabad. There is noise owing to the surrounding retail shops selling different commodities. There are six to eight classrooms and one big hall. Attached to this hall are staff rooms and computer labs. The corners of these four walls are used as four classrooms. There are benches and desks in some classrooms and there are only benches in some others. There are about 5 to 7 computers in each school. The classrooms are well-ventilated and have blackboards. The classes are spacious enough to accommodate 30-35 students. The schools are co-educational and offer both Telugu and English media. Besides, one of these schools offers Marathi and Urdu medium. These schools do not have a playground. The space between the blocks of buildings becomes the playground for the students.

3.4.1 Student profile

Given below are profiles of the students in three schools--A, B, and C. Since no significant differences were found among the students of these schools, the profiles presented below refer to all the three schools. 35 students formed the sample for the study—School A (11), B (12), C (12). By the end of the research study, it was found that the data gathered from only 30 students could be utilized because 2 of the students fell ill and 3 of them were not regular due to personal problems. On the whole, the data from 30 students (6 girls and 24 boys) was taken for analysis. The average age of the students was 16 years.

Learner language

As far as the students’ L1 (Telugu) was considered, all of them were proficient enough to engage in complex thought. Regarding their L2, i.e., English, they started studying English as a subject in their formal education only from Class V. In the state of Andhra Pradesh, until recently, English has been taught to Telugu medium students only from Class V.

An interesting point noticed in the initial interaction with the students was that they were aware of some of the words when they were spelt out but when the same words were written on the board they could not recognize them. A possible
explanation for this could be their exposure to language outside school. Besides, they were born and brought up in the city. A special provision was there in the schools to offer extra classes to develop English language proficiency, which includes spoken English, writing skills, handwriting, etc. Though these students were in the fourth year of studying English, they had also attended additional proficiency classes. However, during the current study, they had not participated in any such courses or programs either in the school or outside of it.

In addition, most of these students were reasonably proficient in Hindi while a few students have native-like proficiency in speaking Hindi.

Motivation

The students were expected to carry a pocket English dictionary to the school. However, only a few students observed this rule. There were also attempts to raise awareness about the importance of English by encouraging students to read newspapers and participate in activities related to the use of English. Some of the students were aware of the importance of English. This positive attitude of the students towards English language learning motivated them to attend the classes in the intervention study regularly.

Family situation

As explained earlier, all these students were from poor economic backgrounds. Their parents were low-paid workers like electricians, plumbers, drivers, servants, etc. One of the strong motivating forces for these students to come to school is the mid-day meal scheme (a policy of the Government of Andhra Pradesh to provide free meals to the students in the afternoon).

In the above descriptions, we have learnt about the environment in which the students were studying. In the following, the interaction with the teachers and the students will be presented.
3.4.2 Interaction with the English language teachers

A series of informal discussions was conducted with the English language teachers of both primary and secondary schools in order to gain acquaintance with the systems in the schools. An attempt was also made to understand their views on teaching thinking as a distinct component in the ESL curriculum. The discussions and interactions revealed the following.

Most of the teachers were aware of the term thinking skills. One or two of them could associate this with Gardner’s Multiple Intelligences. While they were aware of the term ‘higher-order thinking skills’, they said that they were not aware of the specific skills associated with it. In one of the interactions, there was a slightly heated argument regarding the necessity of teaching thinking in the ESL curriculum. It is interesting to note that on the one hand, some teachers said that thinking already exists in the ESL curriculum, on the other hand, other teachers were of the opinion that teaching thinking is not related to the ESL curriculum.

At this juncture, the researcher showed some tasks (tasks as in Lessons 6, 7, and 8) and asked the teachers to reflect on them and explain what skills were embedded in those tasks. After this reflection, they could see a link between the tasks and language teaching. Teachers also mentioned that in the existing coursebooks factual questions were predominant, and therefore, there was little attempt to improve thinking skills.

3.4.3 Interaction with the students

It was necessary to interact with the students before making certain decisions related to the intervention. Besides, understanding the language and cognitive abilities of these students was important in the preparation of the intervention lessons. The researcher interacted with the target group in the three schools. Activities like quiz programmes, spelling bee, solving puzzles, etc., were conducted to understand the motivation levels. This interaction, which took place for three days, with the students divulged the following.

In an ice-breaking game, their ability to memorize was reasonably good. When puzzles were posed to them, their enthusiasm levels were at the highest. All of
them were seriously involved in solving them, which was a positive sign for the intervention. Their language abilities were a cause of concern where their spelling was very poor and it was influenced by the way their mother tongue, Telugu, was written. Nevertheless, they were enthusiastic and motivated to learn English.

The students were informed that they would be offered classes that develop their thinking as well as language abilities. They were also told to attend all the classes since there would be a test at the end of the intervention.

A point that needs mention here is that during the interaction, students were given an opportunity to speak in their L1 also so that it can be understood whether they would be able to demonstrate their thoughts and thinking using their L1. In spite of this, it was noticed that their approach to solving problems was not systematic and organized. Therefore, it can be concluded that the students demonstrated low levels of thinking abilities irrespective of the language used.

The interaction with the students and the teachers informed the study in proceeding further.

3.5 Preliminary study: Phase 1, 2 and 3

The purpose of the preliminary study was to ascertain the current levels of thinking skills and dispositions demonstrated by students. This was necessary to identify the thinking skills and dispositions to be taught in the intervention. The preliminary study constituted three phases—

Phase 1 (Reading Passage with questions that capture thinking skills);  
Phase 2 (2 Writing tasks); and  
Phase 3 (Pre-Intervention Assessment).

The descriptions of these phases are provided below.

3.5.1 Phase 1

In this phase, the students were given a reading passage with questions to assess their thinking abilities. This passage (see Appendix 1) was taken from Langrehr & Langrehr (2003). The aim of this passage was to find out whether the students were able to answer questions that assess thinking skills explicitly. The
reading passage was a stimulus to activate their thinking processes, which meant that they cannot find the direct answers in the passage as in the case of factual questions. Based on the passage, they were to manipulate information in complex ways using their world knowledge. Using the content in the passage, which had clues to the answers, they were expected to write their responses. The researcher provided meanings for the difficult words.

On the whole, there were 15 questions in the passage. In table 3.1, the thinking skills realized through the questions are given.

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Thinking Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Identifying similarities and differences</td>
</tr>
<tr>
<td>2.</td>
<td>Distinguishing between facts and opinions</td>
</tr>
<tr>
<td>3.</td>
<td>Identifying assumptions</td>
</tr>
<tr>
<td>4.</td>
<td>Understanding the underlying design</td>
</tr>
<tr>
<td>5.</td>
<td>Understanding the underlying design</td>
</tr>
<tr>
<td>6.</td>
<td>Understanding the underlying design</td>
</tr>
<tr>
<td>7.</td>
<td>Drawing analogy</td>
</tr>
<tr>
<td>8.</td>
<td>Drawing analogy</td>
</tr>
<tr>
<td>9.</td>
<td>Questioning</td>
</tr>
<tr>
<td>10.</td>
<td>Identifying causes and effects</td>
</tr>
<tr>
<td>11.</td>
<td>Predicting</td>
</tr>
<tr>
<td>12.</td>
<td>Predicting</td>
</tr>
<tr>
<td>13.</td>
<td>Creative thinking</td>
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<tr>
<td>14.</td>
<td>Creative thinking</td>
</tr>
<tr>
<td>15.</td>
<td>Imagining</td>
</tr>
</tbody>
</table>

Table 3.1 Thinking skills assessed through Reading comprehension questions

The following are the findings from this phase:

- The students expressed that they were not familiar with these types of questions. Most of the students could not proceed with answering the questions even after the researcher’s help with understanding the questions.
• Excepting for one or two students, all of them were trying to look for the answers in the text. This reveals a crucial fact to be noted that the students had been habituated to copy answers from the texts. This might be due to the fact that there was a predominance of factual questions in their course books.

• With the exception of the first question, it can be said that they were not comfortable with these types of questions. Students wrote that they could not answer the questions. A kind of frustration and irritation was also witnessed among the students resulting from their inability to answer the questions.

With the findings aforementioned, it was decided to proceed further to understand their current thinking abilities since the students were not aware of the type of questions in the reading passage. For this, it was also necessary to estimate their linguistic abilities, which would help the researcher design a comprehensive assessment to ascertain their language skills and thinking skills and dispositions. This led the study into the next phase.

3.5.2 Phase 2

In this phase, the students were asked to write responses to two tasks, which are given below:

1. Write a short essay on a celebration in your school.
2. Write the similarities and differences between a dinosaur and an elephant.

Using the tasks above, an attempt was made to capture the language abilities of the students. The responses for these tasks were collected and analyzed. The following are the findings of this phase.

• Spelling was the most serious problem found. It could be inferred from the data that they had exposure to most of the words, i.e., they heard the words, but they did not notice the orthography of the words. E.g. Celebrason (for celebration), ripablik (for republic), Baaday (for Birthday), etc.

• Another pattern found among half of the students was that they had no knowledge of writing sentences in the form of a paragraph. The students wrote sentences as if they were trying to list the sentences one below another.
• With respect to their punctuation, about 7 students wrote their responses without a comma, full stop, or any other punctuation marks. Eg. my school good we celebrate independence day sweets chocolates; we pray school assembly we sing janganmana

• About the second task, identifying similarities and differences, they were able to generate some ideas. Eg. dinosaur elephant is big; dinosaur kill people elephant eat grass. This task helped the researcher in arriving at what thinking skills should be taught in the beginning stages of the intervention.

The data from the second phase was useful to the extent of understanding their language abilities and thinking levels from where the intervention could begin. It was decided to include and begin with the thinking skills that the students were familiar with (e.g., identifying similarities and differences) and further the instruction towards unfamiliar and more complex thinking skills. However, a comprehensive assessment of the students thinking abilities was necessary to know the specific skills and dispositions they were struggling with. Therefore, further action that focused on more specific assessment led the study into phase 3.

3.6 Preliminary study: Phase 3

The objective of this phase was to ascertain the specific thinking skills and dispositions which were to be taken up for the intervention. A comprehensive assessment, i.e., Pre-Intervention Assessment (PRI) was conducted, which contained the following tasks—Task 1(A), Task 2(A), Task 3(A), Task 4(A) (i) and (ii), and Tasks 1(B), 2(B), 3(B), 4(E) (See Appendix 2).

Tasks 1(A), 2(A), and 3(A) were related to thinking skills, Task 4(A) (i) and (ii) were related to thinking dispositions, and Tasks 1(B), 2(B), 3(B), and 4(B) were questions that assess their metacognitive thinking. The thinking skills involved in these tasks are listed in table 3.2.
Table 3.2 Skills and dispositions in Pre-Intervention assessment

Though all these skills appear to be discrete, they need to be applied together in the tasks. Except for task 1(A), which is academic in nature, all the other tasks are based on everyday situations encountered by the students. They also have the potential to reveal the logical fallacies students commit.
World Knowledge and linguistic complexity

It followed from Phase 1, 2, and 3 that the linguistic abilities of the students are minimal. This implies that the linguistic complexity in the tasks to be designed should match their abilities. Designing tasks for the Pre-intervention assessment became challenging given the fact that the students’ world knowledge was high compared to their linguistic abilities. But, incorporating deep subject matter might become an impediment for these students to apply their thinking skills. So, it was decided that the tasks in the Pre-intervention should be designed in such a way that they use their current world knowledge in which case their linguistic abilities can be captured reliably.

In the following sections, the descriptions of the tasks in the Pre-intervention are provided.

3.6.1 Task 1(A) Graphic organizer

In this task, the students were expected to read a passage about Arctic region and fill in the diagram given. They were also given freedom to use any diagram other than the one given. Through this task, the ability to organize information was assessed. This ability assumes great importance in the event of the availability of a huge amount of information which varies in significance. Moreover, such skills also help in taking and preparing notes that help in academic learning. To do this task successfully, they should understand the passage and identify key words and phrases to be put in the diagram. Another ability involved here is to categorize the information under headings. The students should have an estimation of how many categories of information can be made out of the passage in order to draw the diagram effectively and legibly.

3.6.2 Task 2(A) Critical thinking

This task includes a short passage where Sanjay, who was allowed to go to the zoo that morning, returned home in the evening with a wound in his leg. Sanjay’s sister concluded that Sanjay must have been bitten by some animal in the zoo. The students, in answering whether that conclusion was right or wrong, needed to justify
their answers. To do so, they should demonstrate their ability to identify the conclusion, premises, and assumptions. Since the information given was insufficient to conclude the cause of the wound, the students were expected to imagine other possible causes to justify their responses.

3.6.3 Task 3(A) Decision making

The task included 1) information about two mobile phones—Nokia and Samsung; 2) personal opinions of other people regarding these phones. In the first component, the information about the two phones was given by the salesman. It had a comparative description of the features available in both the phones, and hence the rhetorical pattern of the text was comparison and contrast. The text in the first and the second component was created in such a way that they cover the positive as well as the negative aspects of the phones, which brought in the complexity of decision-making. The second component constituted the personal opinions of the friends who used or had knowledge of the phones.

The students were expected to read the information and the personal opinions to write a response explaining which phone the students would prefer to buy. To make the decision of buying, they should, identify similarities and differences between the two phones, distinguish between facts and opinions, develop criteria, evaluate the features of the phones against the criteria, and choose the best alternative.

3.6.4 Task 4(A) (i) and (ii) Thinking dispositions

This task, which contains two items, was designed to assess the thinking dispositions. There are two reasons for creating two sub-tasks: firstly, there should be at least two tasks to collect reasonably enough data to assess thinking dispositions. Secondly, the tasks should be able to motivate students to think and write their response given their low language abilities. Therefore, two brief sub-tasks were designed capturing two different thinking dispositions.

In fact, traditionally, a questionnaire used to be administered for assessing them but one of the criticisms leveled against such practice was the inability of such tools to capture them reliably. One’s disposition to thinking critically or creatively in
performance might be reliably documented when compared to asking explicitly about their thinking processes.

In task 4(A) (i), a boy named Rahul goes to a merchant and buys goods his parents asked him to buy. He pays for them without seeking further clarification about the prices. The thinking disposition that was expected of the students was to exhibit an inquiring attitude. Imagining that the students were Rahul, they should explain what they would do in such a context.

In task 4(B) (ii), Vishal, his sister and his mother argue with each other as to who is the most handsome man among the film stars Shahrukh Khan, Salman Khan, and Aamir Khan. The students were asked to express their opinions regarding who was right among the members of the family to consider the issue from multiple perspectives. They were expected to arrive at the fact that handsomeness is subjective i.e., it is purely a personal opinion and one cannot be right or wrong.

3.6.5 Tasks 1(B), 2(B), 3(B), 4(B) Metacognitive thinking

For each of the tasks mentioned above, questions on metacognitive thinking were asked. With the help of these questions, it was examined how far the students were able to articulate their experiences of task performance. In other words, their metacognitive monitoring and evaluating processes were traced. While metacognitive monitoring refers to checking and employing cognitive resources in task performance, evaluating entails assessing the effectiveness of the cognitive processes in task performance.

The total time allotted for the Pre-intervention assessment was 3 hours and the students were to adjust the time available among the tasks. The responses to the tasks in the assessment were collected and analyzed. Specific criteria were developed for assessing the responses. Using these criteria separate rubrics were designed for each of the tasks since each task assesses different thinking skills or dispositions. The written responses of the students for Pre-intervention assessment were analyzed.

The analysis revealed that the students had problems with the thinking skills and dispositions involved in the Pre-Intervention Assessment. Most of the students were not able to demonstrate their abilities related to critical thinking, decision-
making, etc. However, the findings from the analysis of the Pre-intervention assessment will be presented comprehensively in chapter 4. This is necessary to facilitate better comparison of the findings from the Pre-Intervention and the Post-Intervention assessments.

3.7 Intervention programme

The findings from Phase 3 revealed the fact that students needed help with regard to the skills and dispositions mentioned in Table 3.2. An Intervention programme was planned covering all those skills and dispositions. The Intervention programme contained 12 Lessons on thinking skills and dispositions and 2 Lessons on metacognitive thinking.

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Skill/Disposition</th>
<th>No. of Items</th>
<th>Time in Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Identifying Characteristics/Properties</td>
<td>6 Items</td>
<td>2</td>
</tr>
<tr>
<td>2.</td>
<td>Identifying Similarities</td>
<td>7 Items</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>Identifying Differences</td>
<td>10 Items</td>
<td>2</td>
</tr>
<tr>
<td>4.</td>
<td>Categorizing</td>
<td>12 Items</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>Categorizing (2)</td>
<td>1 Task</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>Representing</td>
<td>2 Tasks</td>
<td>3</td>
</tr>
<tr>
<td>7.</td>
<td>Identifying Conclusions and Premises</td>
<td>10 Tasks</td>
<td>3</td>
</tr>
<tr>
<td>8.</td>
<td>Identifying Assumptions</td>
<td>10 Tasks</td>
<td>3</td>
</tr>
<tr>
<td>9.</td>
<td>Distinguishing between facts and opinions</td>
<td>2 Tasks + 6 Items</td>
<td>3</td>
</tr>
<tr>
<td>10.</td>
<td>Distinguishing between the relevant and the irrelevant</td>
<td>14 Items</td>
<td>2</td>
</tr>
<tr>
<td>11.</td>
<td>Developing Criteria</td>
<td>8 Items</td>
<td>2</td>
</tr>
<tr>
<td>12.</td>
<td>Considering Multiple Perspectives (Disposition)</td>
<td>3 Tasks</td>
<td>3</td>
</tr>
<tr>
<td>13.</td>
<td>Metacognition – 1</td>
<td>2 Tasks</td>
<td>2</td>
</tr>
<tr>
<td>14.</td>
<td>Metacognition – 2</td>
<td>2 Tasks</td>
<td>2</td>
</tr>
</tbody>
</table>

**Total**

63 Items + 32 Tasks = 31 hours

Table 3.3 Overview of the Intervention programme
Table 3.3 depicts the details of the Intervention Programme, which is followed by the contents of each lesson. It was also decided that the researcher should be the teacher for the intervention programme given the exploratory nature of the study.

Before proceeding further, a distinction is made between two terms—items and tasks—to signify cognitive complexity. Based on Resnick’s (1987) characteristics of higher-order thinking a task has most or all of the following features.

- **A task is non-algorithmic**
  The path in the approach to be adopted in making a decision or solving a problem is not specified in advance. The students need to develop their own mental map in gleaning, collating, and organizing the information to respond to the task. Further, they have to decide on how to present the response.

- **A task is cognitively complex**
  The students cannot make a decision or solve a problem using the information only from one source. In the process of negotiating through the information, they need to exercise a set of thinking skills. Since there is no predetermined sequence, the cognitive processes tend to be associative in nature, which results in complexity with regard to task performance.

- **A task is effortful**
  A task is effortful and demands active mental processing.

- **A task yields divergent answers**
  There is no perfect solution for a task and it hence calls for divergent thinking. The task needs to accommodate varied views and answers of many students. There is no perfect or best reason. For e.g., even in choosing a mobile phone, there is more than one option.

- **A task requires regulation of cognitive processes**
  The students have to metacogitate in that they have to organize the information and plan the task performance.

The features above have been adapted from Resnick’s (1987) characteristics of higher-order thinking. However, this study is not aimed at only higher order thinking. Instead, the study recommends the teaching of various levels and types of thinking.
Similarly, Item, as conceived in the study, is a fill in the blank or a multiple choice question. Unlike a task, an item does not require most of the aforementioned features of a task. The distinction between a task and an item is needed to underscore the levels of cognitive complexity captured in them. Further, when teaching a thinking skill that has only one or two procedural steps, an item might be used. A task is helpful when there is a complex interplay of more number of thinking skills. For instance, in teaching the thinking skills identifying characteristics (see Lesson 1), only items were used since there were no multiple procedural steps involved. Similarly, in the case of Lesson 9, tasks were used as the students were to go through several steps: identifying facts in discrete sentences, identifying opinions in discrete sentences, and writing a factual description in the form of a paragraph.

Before we discuss the intervention process, it is essential to understand the guiding principles for teaching thinking as a distinct component in the ESL curriculum.

3.7.1 Principles observed in teaching thinking

Given the complexity of teaching thinking, it is necessary to lay down principles that define and guide such instruction. The study was informed by various approaches and programmes for teaching thinking, based on which the following principles were observed.

i) Second language development

Though teaching thinking skills and dispositions are aimed at enabling students to make better decisions and solve problems effectively in personal and professional lives, such teaching should result in second language development—English in this case. This principle should be observed scrupulously because language is a tool for thought; language is central to the education process; language development aids learning of other subjects too. In other words, teaching thinking, it is argued here, need to use language to develop thought and develop language through creating a need for articulating thought and thinking processes thereby motivating them to use language. When language learning takes place in such a manner, it can lead to far transfer to other domains of knowledge.
ii) Transfer

Teaching thinking might be considered a solution, or at least a solution in part, to the problem of transfer. The very purpose of education is to enable students utilize and apply what they learn at school. Unfortunately, while most students, even after achieving high scores in school achievement tests, are unable to transfer knowledge and skills to their everyday life. There are various causes behind the problem of transfer. Among these causes lies the practice of memorization of factual information. Facts are important but they can quickly become outdated. But “[T]hinking skills never become outdated. On the contrary, they enable us to acquire knowledge and to reason with it, regardless of the time or place or the kinds of knowledge to which they’re applied” (Sternberg, 1985, as cited in Beyer, 1987, p. 4).

iii) Explicitness.

Presuming agreement to the argument that teaching thinking has the potential to solve transfer problem to at least some extent, how it should be taught is the next question to be addressed. It is recommended here that explicitness needs to be treated as fundamental to teaching all thinking skills and dispositions. A contradiction to this view is rooted in the concept of skill. The aim of skill learning is achieving automaticity for which exposure and performance are important; there is less need for explicit articulation of meta-knowledge of skills. But thinking is highly abstract and any attempt to improve it needs explicit and overt reference to the skills and dispositions. For instance, one of the skills, identifying assumptions, might be performed implicitly by students without having awareness of and control over the cognitive processes underlying the skill. As a result, the student might effectively perform the skill in one or two contexts. On the contrary, if the students are informed of the name of the thinking skill and disposition, it can certainly help them to apply it in various different contexts. Such discussion related to meta-knowledge can help them access and modify their cognitive processes at a generic level. Furthermore, explicitness holds promise for the development of metacognitive thinking.

Hence, it is argued here that the names of skills, strategies, and dispositions should be used in teaching thinking if such instruction has to lead to transfer.
iv) **Eclecticism**

An eclectic approach needs to be adopted with regard to materials and methodology. Tasks, activities or exercises need to be developed to realize the specific skills, strategies, and dispositions. Materials accommodating different levels of authenticity and various types of input, i.e. verbal/non-verbal, can be prepared. While there can be a general pattern for teaching a thinking skill, changes in the methodology might be necessary since all the skills/strategies do not have the same procedural components and all dispositions cannot be taught using only one method, for example, through dialogue. The justification comes from the fact that teaching thinking involves diverse issues from different fields, and as such the use of multi modal task input and performance. Therefore, any one method or approach might not be enough to capture all the skills, strategies, heuristics, and dispositions.

v) **Mediation**

Students might be provided with an effective stimulus but it cannot guarantee learning. It is easy to fall prey to logical fallacies and fallacious assumptions despite exercising caution. In addition, as explained in section 3.7, thinking is an effortful activity, or as de Bono (1976) reminds, is boring. It is essential that the teacher should provide such an environment where students freely express their thoughts and thinking processes. Further, students need to be pushed and prodded to move out of their 'comfort zone' to think deeply. Therefore, mediation by the teacher is strongly recommended.

vi) **Use of L1**

Use of L1 is undoubtedly a requisite that cannot be overlooked. In fact, absence of L1 is unimaginable in the case of teaching English regional medium students. Using L1 is the means of accessing their cognitive operations to whatever extent possible. The intervention should allow students' as well as teachers' articulation of thoughts and thinking processes and assign L2 language labels to the clusters of thinking skills or dispositions. As a result, it is argued here that students must be enabled with L2 as a tool for cognitive processing in addition to their L1.
vii) Divergence

The nature of the mediation, which has been laid down as essential, assumes significance in view of the diverse thinking abilities of the students. The descriptive account of thinking provided by psychologists specifies cognitive skills which include mental procedures or processes such as categorizing, extrapolating, evaluating, etc. In contrast to this procedural and value-neutral view, philosophers argue that thinking is essentially linked to the value systems of people. On balance, both views are complementary rather than contradictory. Hence, it is suggested here that students’ divergent views and beliefs should be entertained and accommodated so that they begin to reflect on their views, thus, resulting in the modification or refinement of their thoughts.

viii) Collaboration

For thought to be modified, articulation functions as a channel. The quality of articulation is directly proportional to the conduciveness of the classroom environment since articulating one’s value system demands a positive environment. Collaboration holds the key for such articulation, where working together with peers enables them to share their views resulting in effective thinking.

3.8 Intervention process

Guided by the findings from the Preliminary study and the principles of teaching thinking, intervention lessons were prepared. The intervention was spread over 31 hours of instruction spanning 8 weeks. The instruction included 14 lessons, 11 lessons focused on thinking skills, 2 lessons on metacognitive thinking, and 1 lesson on a thinking disposition. Most of the lessons took 2 days on an average.

In the following sub-sections, a detailed day-wise description of the lessons, their contents and classroom processes are provided.

3.8.1 Identifying characteristics/properties (Lesson 1) (2 Days)

As has been explained, it was decided to begin with thinking skills, identifying similarities and differences and such skills require the ability to recognize the underlying properties, characteristics, features, etc. In Lesson 1 (See Appendix 3), the
names of six objects were given to the students in a handout. The students should identify the properties of these objects and the reasons for those properties.

Day 1:

The teacher introduced the skill by explaining its meaning, where the teacher used L1 synonyms of the words used in the skill. By taking the example of a chair, the properties were written on the board along with the reasons for properties. For instance, one of the properties is parts (four legs) and the reason for properties is because it has to stand. As for the language, they were asked to write only phrases to encourage them to attempt to write. This was followed by explaining how it is useful in real life.

Later, the teacher took the first item, coin, and began modeling how to identify properties and reasons for them by giving them a strategy called SCUMPS, which stands for Size, Colour, Use, Material, Parts, and Shape (Langrehr & Langrehr, 2003); and demonstrated how this strategy could be used to identify the characteristics/properties. However, this strategy is useful only for physical objects. During the modeling, a problem occurred in relation to coin, where the students got stuck with which coin was referred to, i.e., whether it was a one-rupee coin or any other coin. Then, it was agreed to be a five-rupee coin. Another problem was what five-rupee coin I was referring to—the one made with nickel or bronze. Then, the students were given an opportunity to consider either one of them or both.

After this, the students were asked to form pairs and write their responses for the rest of the items. They were also encouraged to use SCUMPS strategy, which was derived from the strategy Attribute Listing (See 2.6.17). They could use the strategy only for the item, flag and they had problems with the rest of the items.

It was realized that such tasks or exercises should be closely connected with reality. Also, caution needs to be exercised to enhance specificity.

Day 2:

The class began with the recapitulation of the SCUMPS strategy that was discussed the previous day. While some students wrote their responses for two more
items, others did not do the work. As a result, the students were put in pairs again to complete the work in the handout. Some critical incidents are given below.

In the case of the object tree, when the students tried to apply the strategy SCUMPS, they could not determine the shape of the tree. This offered a good opportunity to discuss the fact that any one strategy is not suitable for all kinds of objects.

Another critical incident occurred in the discussion of reasons for properties of car tyre. Having recognized the colour of the car tyre, i.e., black, the students were intrigued by the fact that tyres are always black, a fact that even the teacher had not thought of before. Then the students were encouraged to find out and tell the answer the next day. One of the students searched on the internet and came up with the answer that the colour was due to the presence of carbon. The student was appreciated for the effort in class.

3.8.2 Identifying similarities (Lesson 2) (2 Days)

Lesson 2 dealt with comparing and identifying similarities between two things. Seven sets of two things each were given in a handout. The students were to identify the properties of both the things in each set. While identifying similarities was the main objective of this lesson, expressions like both of them, both, and and were also taught implicitly. In each set, two things which are not usually compared were given, which created a lot of interest among the students.

Day 1:

The skill of identifying similarities was introduced by translating in Telugu, saaroopyathalu in order to help them understand what was expected of them. The teacher reviewed SCUMPS strategy discussed in Lesson 1 and explained that it would be useful in this and the next lesson to come. Then the teacher elicited properties of both flowers and birds and wrote them on the black board. The following is an example:

**Student 9**

<table>
<thead>
<tr>
<th>Flowers</th>
<th>Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petal</td>
<td>wings</td>
</tr>
</tbody>
</table>
In this and the other lessons, whenever the teacher elicited answers, the students were encouraged to respond in English. However, in most of the cases they did not have the ability to express them in English and so they were asked to express the same idea in Telugu. The teacher, then, translated the same in English and wrote them on the board. For instance, the students said in the elicitation rekulu in Telugu to refer to petals. So, vocabulary learning took place in almost every class.

After eliciting the properties, the teacher wrote the similarities between flowers and birds on the board.

**Student 4 (Copied from the board)**

* Both of them are in different colours.
* Both of them have life.
* Both of them can grow.

They were also shown the other ways of expressing similarities:

**Student 4 (Student responses)**

* Flowers are in different colours and Birds are also in different colours.
* Flowers are have Life and Birds are also Life.
* Flowers are in have grown Birds are also grow.

While the first set of sentences was written by the teacher on the board, the second set was written by the students with the help of oral clues by the teacher. The students were then asked to sit in pairs to complete the rest of the items. The students completed two sets, which were followed by the oral production of their written responses. The teacher then provided recasts for them. This can be witnessed in the following interaction, with respect to the item door and book, in the classroom.

*Student: Both of them we close them.*

*Teacher: Oh, you mean to say, both of them are closed.*

*Student: ...both of them are closed.*
The written responses of some of the students were also checked and corrections were suggested.

**Day 2:**

The class started with the teacher’s revision of the use of both of them, and and. The students were asked to pair up and write their responses for the rest of the items left to be done on the previous day. The most interesting set of items was the numbers 4 and 9. Initially, they were a little surprised to identify similarities. When given a clue, i.e., both of them are used in Maths, there were responses from the students such as they are single digit numbers, there is a closed shape in both of them. This kind of thinking was stimulating for them. Similar response was found in the case of the item a square and a circle. In the discussion of these two items, the classroom became one of mathematics. On this day, most of the students used the language expressions, both of them and and.

### 3.8.3 Identifying differences (Lesson 3) (2 Days)

This lesson dealt with contrasting and identifying differences between the things in 10 sets. Like identifying similarities, identifying differences requires the skills of identifying characteristics and properties of objects, etc. Language focus here included the use of but to express the contrast.

**Day 1:**

The class started with the introduction of the skill identifying differences by explaining its meaning in Telugu, thedaalu in order to help them understand what was expected of them. The revision of SCUMPS strategy, which was discussed in Lesson 1, was done by the teacher to explain that it would be useful in this lesson. Unlike on Day 1 of Lesson 2, the teacher did not elicit the properties of both the chair and birds, (which was the first item in the handout) but wrote, on the blackboard, the sentences that express the differences and the students copied them. Following is an example:

**Student 3**

=> We write on a table but we do not write on a chair.
=> We sit on a chair but we do not sit on a table.
=> A table is big but a chair is small.
A chair has handles but a table has no handles.

The students were then asked to form pairs to complete the rest of the items. The students completed four sets of things, which were followed by the oral production of their written responses for which the teacher made recasts. Some of the written responses showed signs of learning.

**Student 3**

Crab, fish

Crab has six legs but fish has no legs.
Crab will has live on land but fish will cannot live on land.
Crab will bite but fish will cannot bite.

**Student 20**

crab, fish

- a fish legs is small but crab legs big
- crab is moving a land but fish is not moving a land
- fish not bites but crab was bites

It is clear from the above that the students have problems with using modal auxiliaries.

**Student 12**

4, 11

four is single-digit number but eleven is a double digit number.
four is an even number but eleven is an odd number.
four has a square root but eleven does not have a perfect square root

It might be observed that the students have begun using the conjunction but to express contrast.

**Day 2:**

The class started with the teacher's revision of the use of but. The students were asked to form pairs and write their responses for the rest of the items. A few problems were encountered on this day with regard to the knowledge of the terms democracy, dictatorship, artery, and vein. The teacher intervened and explained the meaning of the terms mentioned above after which they were able to write their responses. Discussion of the terms led the teacher and the students to bring subjects
across the curriculum—biology (artery, vein), social studies (democracy, dictatorship),
mathematics (circle, triangle), etc. Therefore, it is quite obvious that teaching thinking
explicitly aligns with the principles of language across the curriculum.

3.8.4 Categorizing (Lesson 4) (1 day)
This lesson aimed at grouping things, i.e., categorizing or classifying. In order
to group things under a category, students need to have the knowledge of the
properties/attributes/characteristics/features of the things. Besides, they need to
compare properties of the objects given and their functional use to arrive at a phrase or
an expression that encompasses the given words. For instance, to put the first set of
words scissors, magnet, nail into a category, students must have the knowledge of
where these are used; and they should find a common use to arrive at the category
term, which forms the super-ordinate concept.

As for language learning, vocabulary formed the focal point in this lesson.

The teacher began the class introducing the term categorizing and its meaning
in Telugu, i.e., vargeekaran. To let the students understand the importance of this
skill, the teacher used the metaphor of computer. A file is stored in a folder which is
in turn stored in another folder and so on. The name of the folder is set based on the
nature of the file stored in it and it assumes significance in accurate and quick
retrieval. Similarly, information stored in brain is also organized into categories and
appropriate labels for a category can help them access the information accurately and
quickly.

After the students were introduced to the skills of categorizing, they were
asked to write the category labels for the terms in the handout. For this activity, the
students sat in pairs to discuss and write the labels.

A major problem, which had been anticipated earlier, encountered here was the
lack of English language knowledge to write a label for the categories. These are the
situations which need to be utilized to develop English language as well as thinking
abilities. As regards the first set of words, the students were able to come with labels
in their mother tongue—panimulu (tools), vasthulu (things), etc. This created a
situation where there was intense activation of their English knowledge.
simultaneously creating a strong need to know the mother-tongue equivalent in English. The teacher helped the students by giving them the appropriate label instruments/tools. With such scaffolding, it was hoped that the students would be enabled to engage in cognitive processes using L2 too.

The students had problems with the following words in the handout: beetle, fog, uranium, lever, ramp, hemp, and cork. The meanings of these words were explained to them. Even so, there were problems with 2 sets of words—lever, ramp, pulley; cork, iceberg, apple.

In the case of the first set of words, the difficulty was posed by the word ramp, which they could not equate with the other two words (lever and pulley) that could be called machines. With regard to the second set, i.e., cork, iceberg, apple, most of them said that two of them are natural and one is artificial. That these three things float in water was so intriguing to them that smiles on their faces were apparent signifying how stimulating such kind of thinking was.

As with the other lessons, the items in this lesson also had links to other subjects, and therefore transfer is inbuilt in the items. For example, the property of floating is usually discussed as part of Physics. When the student is encouraged in thinking about the properties of objects, the cognitive experience will help in the better and deeper understanding of the concepts such as floating in Physics.

3.8.5 Categorizing-2 (Lesson 5) (1 day)

In the previous lesson, categorizing requires identification of common functional use to arrive at a category label. In this lesson, the students were given a list of words to be put under four categories based on given criteria. This task was designed based on the thinking strategy, List, Group, Label (See 2.6.9).

The task in the handout readily yields itself to students' understanding of the skill required in doing it. Since this is a continuation of the previous lesson, there was no necessity of introducing the skill again. So, the students went straight ahead in doing the tasks in pairs.

It was realized during the task that the fourth category (See Appendix 3)—things whose colour does not begin with b—was slightly confusing for the students.
proving the well-established fact that processing negative statements in discourse is one of the toughest aspects.

With the items carpet and soap, there was a slight argument among the students, where some of them averred that carpet and soap were also found in the kitchen whereas the other set of students felt that soap would generally be in the bathroom and carpet would be in the main hall or drawing room but not in the kitchen. The teacher intervened and told them that if they found these things in kitchen rooms they saw, they can put them under the respective category.

3.8.6 Representing (Lesson 6) (3 days)

Representing refers to changing the form of information into another to show how the main elements in them are related. There are various kinds of representations—visual, verbal, and symbolic. Representation could also be a mental image (internal) or a diagram (external). However, in this intervention, it is limited to external representation with a focus on graphic organizers. The skill of representing (external) is an important thinking ability that helps the students articulate their internal representations. Further, it encourages nonlinear or associative thinking, promotes better understanding of various elements complexly embedded into the linear information, and improves their metacognitive processes.

Day 1:

The objective of this lesson was to teach students how to make an external representation of the information given. They were supposed to get practice in arranging the verbal information into a graphic organizer.

The class began with the teacher’s showing of two pictures of elephants and asking the students to find out the differences and similarities between the two pictures. All of them could find only one difference, i.e., one elephant has large ears and the other has small ones. Following this, they were given the handout in which a passage on African and Asian elephants was given. The students were asked to read the passage silently for a few minutes and try to understand it. After ten minutes, the teacher asked them if they had any difficulty in understanding the passage. Some of
the students wanted the meanings of the words tasks and blimps for which the teacher gave the meanings.

Then, the students were given another handout which contained a table with boxes to be filled in with the information from the passage for which they were asked to form pairs again. Some of the students finished filling in the table by the end of the class.

**Day 2:**

The students were given 10 minutes to finish the task, after which they were given another handout that had the graphic organizer (compare and contrast). Though the students were given handouts, they were asked not to write anything on the handout but write on the white sheet provided to them. The same practice was followed throughout the intervention because the entire data could be collected systematically. The graphic organizer contained two big intersecting elliptical circles. The students had to write the information that is specific to each type of elephant in the elliptical circles whereas they had to write the common points in the intersection area. The teacher drew the diagram on the board and modeled how to do it.

After the diagram was filled with the information, the students realized that there were many differences which they had not known before. At the same time, they could find only one or two similarities. At this juncture, the teacher introduced them to the skill of representing and how important it is in learning and everyday life.

**Day 3:**

For task 1, the students were predominantly helped by the teacher whereas task 2 was to be done by the students. The students were asked to read the passage on dugongs and manatees. Though they were not aware of these sea creatures, they were asked to read it with the limited understanding that they live in water. They were given 10 minutes time to read the passage silently. After that they were given an opportunity to clarify their doubts if they had any. A few words bothered the students—snout, flippers, whiskers, etc. The students were encouraged to guess the meaning depending on the context. As a result, they could guess the meanings of all the three words.
This was followed by the activity of filling up the table and the graphic organizer. The tasks in this lesson integrated the skills learnt in the previous lessons. For instance, they need to compare and contrast dugongs and manatees, and create categories to organize the information in the graphic organizer.

3.8.7 Identifying conclusions and premises (Lesson 7) (3 days)

Whereas the skills in Lessons 1 to 6 cover the core thinking skills in the components of thinking (See table 2.1 in chapter 2), identifying conclusions and premises forms part of critical thinking skills category. The function of analysis is to look inside the thoughts and ideas based on which we identify and distinguish components, identify relationships and patterns, etc. The components of a simple argument can be expressed in terms of premises and a conclusion. These skills help learners to overcome the fallacies in day to day events. In Lesson 7, 10 tasks were designed to capture the fallacies that students encounter in their everyday lives. The students had to identify the conclusion and premises and respond to the line of reasoning involved. The language focus in this lesson was transitional linking devices since, because, therefore, so, etc.

Day 1:

The teacher explained the meaning of a conclusion and a premise. There was considerable difficulty for the teacher to explain the accurate meaning of conclusion since there was no exact Telugu equivalent that captures the meaning as used in the analysis of an argument. The teaching in the lesson was carried along the lines of a Socratic dialogue, which is given below:

Teacher: In task 1 (Lesson 7, See Appendix 3), Rahul wore black shirt during quarterly examinations and he got A grade in those exams. So, finally what is his decision or conclusion?

Students: He will wear black shirt for the final examinations also. (Some of them answered in L1 and others answered in L2 with grammatical errors.)

Teacher: That's his decision, right?

Students: Yes.
Teacher: That is called Conclusion. A conclusion is a decision, a recommendation, or a suggestion.

Teacher: Now, write down the conclusion in your white sheets.

Students: (The students write)

Teacher: (after a minute) Have you finished writing?

Students: Yes sir.

Teacher: You said that Rahul decided to wear black shirt for the final examinations. How did he come to that decision? On what basis did he decide to wear black shirt? What was the reason he provided for making that decision? Now, can you tell me the reasons for that decision?

Students: Rahul got A grade in quarterly examinations.

Teacher: This is called a Premise. A premise is a reason for the conclusion. So, What is a premise?

Students: (No answer).

Teacher: A reason. What is a premise?

Students: A reason.

Teacher: All of you write down the premise in your white sheets. So, in the following tasks you should find out conclusions and premises. I will give you some tips and clues which are helpful in identifying conclusions and premises. Ok..

Students: Ok, Sir.

Teacher: After the words, therefore, so, generally...most of the times...you find conclusion. Similarly, after the words since, because, as, and for, you find the reason or ..... 

Students: (no answer)

Teacher: ..reason or .....?

Students: Premise

Teacher: That's right. Premise.
A similar dialogic approach was followed for the rest of the tasks. The students were paired up for doing the other tasks. They could complete only the 2nd task on this day.

**Day 2 and 3:**

With a review of the concept of conclusion and premise, the teaching began on the 2nd and 3rd day. Students were paired up for doing the rest of the tasks. When they were asked to read the 3rd task and write down the conclusion and the premise it was noticed that the students had a problem with identifying conclusions in task 3 since there were two persons. A clarification from the teacher made it easy for them.

The rest of the tasks were done by the students on the 2nd and 3rd day. The teacher helped the students wherever needed using the dialogic approach mentioned above. Some of the observations are given below.

Some of the students mistook conclusion for premise and vice versa.

**Student 15**
Conclusion: You are very handsome Pranav.
Premise: So you will surely get a software job.

**Student 18**
Conclusion: If you do any work on Tuesday
Premise: You will complete that work.

Regarding language learning, most of the students began using the linker *because*.

**Student 21**
Conclusion: Vishal got first prize in essay writing competition
Premise: because he used cello faster pen

**Student 22**
Conclusion: Swati won the miss beauty competition recently.
Premise: because she used Head and Shoulders shampoo.

Some of the students could not change the pronouns in the task while writing the conclusions and premises.
In analyzing an argument, conclusions and premises need to be traced first. To assess the strength of the reasoning involved in drawing the conclusions based on the premises, students need to dig into the information given to find out if the author of the argument is assuming certain courses of action. If the author assumes those courses of action, which are not explained or proved, those assumptions could be a source of potential flaws or fallacies in the line of reasoning. Hence, the students were taught how to find the assumptions in an argument.

### 3.8.8 Identifying assumptions (Lesson 8) (3 days)

In day-to-day life, the arguments encountered are often arguments where crucial assumptions are not made explicit. It is an important part of critical thinking that we should be able to identify such assumptions. Assumptions, always hidden, divulge people's beliefs which can reveal the source of fallacious reasoning. Enabling students to see through the assumptions in their reasoning could help them solve problems and make decisions effectively. Though there are many logical fallacies that exist in the literature, only one of them is taken up for teaching in this intervention—causal fallacy.

In this lesson, students were taught to understand what assumptions are, how to identify and overcome causal fallacy. The language focus, in the use of other possibilities, was the use of modal auxiliary might in its perfect conditional form.

**Day 1:**

The class began with explaining what an assumption was and its Telugu meaning, i.e., anukonute or anukovatam. However, this meaning cannot convey its depth unless they are put in a situation to understand it. Therefore, the dialogic
The approach followed in Lesson 7 was used for the purpose. The dialogue below demonstrates the method.

Teacher: In Lesson 7, we learnt how to identify conclusions and premises. In this lesson, we shall discuss how to identify assumptions. For this, the tasks we used in Lesson 7 will be used in this lesson too. Are you ready?

Students: Yes sir.

Teacher: Let's take task 1. In this task, we have identified the conclusion drawn by Rahul. Can you tell me that?

Students: Rahul will wear black shirt for the final examinations.

Teacher: Yes, can you tell me the premise for that conclusion?

Students: Rahul got A grade in quarterly examinations.

Teacher: Now, Rahul says he got A grade because of the black shirt. So, he believed that the black shirt was the cause for A grade. He assumed that the black shirt gave him A grade. So, the assumption is thinking that the black shirt resulted in A grade. Do you agree with this? Do you think that this assumption is right?

Students: No. (Almost all the students responded)

Teacher: But Rahul said very clearly that he got A grade because of his black shirt. So, his black shirt was the cause for his A grade.

Students: No. No.

Teacher: Why do you not agree with him? Then, how did he get A grade?

Students: He might have studied well (The students were not able to use the modal).

Teacher: So, you are saying that there might be other possibilities which were the causes for his A grade?

Students: Yes, sir.

Teacher: Can you tell me some of those possibilities?

The teacher elicited other possibilities from the students. The responses were in L1 and L2 with code-mixing and code-switching features. The teacher recast them into grammatically accurate sentences, using the appropriate modal auxiliary, and wrote
them on the board. The recasts written on the board can be seen in the notes of the students.

Student 12:

Other Possibilities:
1) He might have studied well.
2) He might have taken slips to the exam hall.
3) He might have copied from his friends.
4) Examiner might have helped him.
5) He might have got marks given to the other student.
6) Examiner might have given marks wrongly.
7) The question paper might be very easy.
8) He might have taken personal tuitions.
9) He might have listened to the classes very carefully.
10) He might have attended classes regularly.

Following this, the students were paired up to discuss and do the rest of the tasks. They could do only task 2 on Day 1 and it was carried over to the next day.

Day 2 & 3:

On both the days, the concept of assumptions was reviewed at the beginning of the classes. The students were asked to form pairs for doing the rest of the tasks. A similar dialogic approach was followed on 2nd and 3rd day also whenever students asked for help. Each pair was asked to talk about the other possibilities they had written and those possibilities were discussed. Some of the observations are presented below.

With regard to identifying assumptions and other possibilities, they were successful to a large extent. But in the case of language use, some of them used the modal might but they could not use the verb in the third form.

Student 19:

(Student’s response for Task 6)

Other Possibilities
i) she might have pretty and Gorgeous.
ii) she might have dressing well.

iii) she might have very nice hear.

iv) she might have very good looking

v) she might have very cleaver

In spite of the emphasis on the modal *might* and its structure and meaning on day 1, some of the students on the 2nd and the 3rd day used other modals instead of *might*.

**Student 10:**

(Student’s response for Task 5)

Other Possibilities

1) People will like him more

2) He help for people more

3) He will give money for people and take vote

4) He will give electrick, water, food free

5) He may have demand for people and taken vote.

3.8.9 **Distinguishing between facts and opinions (Lesson 9)(3 days)**

Lesson 9 (See Appendix 3) focuses on the skill of *distinguishing between facts and opinions*. Facts are statements that can be proven by verification through evidence. The evidence can take the form of research studies, statistics, records, photographs, etc. An opinion is a statement that expresses one’s belief or judgment that cannot be proven by verification. However, it should be noted that facts and opinions are not antithetical and all the statements cannot be classified under only these two categories. Lesson 9 has three parts. Part-I contains 25 statements and the students have to say whether each of the statements is a fact or an opinion. Part-II(A) contains a passage and two questions for finding facts or opinions. Part-II(B) has questions and options of various situations to choose from, and Part-III contains two tasks. Each task has two pictures. The students had to write 5 facts and 5 opinions based on the pictures and write only a factual description of the pictures.
Day 1:

The teacher explained the meaning of a fact (vaasthavam) and an opinion (abhipraayam) and how important it was to distinguish between both of them in making decisions in everyday life. To let the students know the importance of the skill, the teacher discussed the bomb blast incident, which had taken place two days before in Hyderabad. When the teacher asked the students to comment on that incident, most of their comments were opinions rather than facts. Further, some of the opinions were very strongly asserted by the students. When asked the basis for their opinion, they realized that they were giving just their opinions, which were not based on any evidence. Taking a cue from this incident, the students were asked to go through the 25 statements in Part-I and write down whether each statement is a fact or an opinion. The students were given 15 minutes time for this exercise. The students were quite comfortable in doing this exercise. Similar to the previous lessons, a dialogic approach was followed for giving clarification to the students. A sample is given below.

**Student:** The flag of India has white colour. Is it a fact or an opinion?
**Teacher:** Tell me whether it is a fact or an opinion.
**Student:** It is a fact.
**Teacher:** How can you say? What's the evidence?
**Student:** I can show the flag.
**Teacher:** Then, that is a fact.

In this way, they were made to understand the difference between facts and opinions.

Day 2:

Part-II of the handout was dealt on the 2nd day, where the class began with the review of the concept of facts and opinions. Beginning with Part-II (A), the students were asked to read the passage and answer the questions. The evidence, in the case of facts, should be only from the information provided to them in the passage. Almost all the students did it very comfortably. This was followed by exercise (B), which was also done by the students with ease and interest.
In Part-II verbal stimulus was used whereas in Part-III pictures were used to develop the skills of distinguishing between facts and opinions. In task 1, two pictures were given with numbers 5 and 6 indicating that the incident in 6 happened after the incident in picture 5. The students were asked to carefully look at the two pictures and write 5 facts and 5 opinions on them. This was carried forward to the next class.

Day 3:

In the previous class the students were asked to write 5 facts and 5 opinions. After that each student was asked to give one sentence from their list. These were written on the board correcting the grammatical errors if there were any. After all the students' sentences were rewritten correctly on the board, they were asked to note them.

**Student 3  (Responses based on the picture)**

1. He fell down. (Fact)
2. Car brakes failed. (Opinion)
3. An Accident happened. (F)
4. The car turned over. (O)
5. A jeep turned over. (F)
6. A puppy came on the road. (O)
7. He did not know how to drive. (O)
8. He drove very fast. (O)
9. He is in the air. (F)
10. He is talking over phone. (F)
11. He drove after drinking alcohol. (O)
12. The tyre was punctured. (O)
13. There was a bomb in the car. (O)
14. He had a headache. (O)
15. He was asleep. (O)
16. The parts in the vehicle fell down. (F)
Having pooled all the facts and opinions based on the two pictures, the teacher asked the students to write a factual description of the two pictures. They could also take the help of the sentences written on the board. This meant that they should not write opinions. Most of the students were quite successful in writing the factual description avoiding opinions.

Followed by this, a brief discussion was conducted helping the students realize that if an incident takes place we hear a lot of opinions. This task reflected the reality in that they could not use most of their sentences in the factual description since those were opinions.

Next, the students were asked to write a factual description of the two pictures in task 2. In this task, the students were not asked to write discrete sentences that are facts or opinions. Instead they were asked to write a paragraph that is a factual description of the two pictures. Some of their responses are presented here.

**Student 13**
He drinken and drived and He is falling down and one person came there and he saived and he driving the vehicle.

**Student 24**
One man fell down in the bus stiring And one person came and seeing the man then the person thinking this man fell down ok ok this is the good time I don’t know the driving then I try the vicl.

As we can see the above student language was problematic but they were able to produce factual description without presenting their opinions. Further, they also began writing in paragraphs rather than in discrete sentences.

### 3.8.10 Distinguishing between relevant and irrelevant information (L10) (2 days)

The skill of identifying what is relevant and irrelevant in a given context is very significant in solving problems and making decisions in personal and professional life. There are three exercises in this lesson. Exercise I contains 5 items in which each of them presents a decision-making situation and four choices of information. Given the situation, they need to mention whether the information in
each choice is relevant or irrelevant. Exercise II contains 5 brief conversations where there would be irrelevant answers which were to be identified by the students. Exercise III contains brief physical descriptions of four persons. A part of the information in each description is not related to physical description. This irrelevant part should be identified by the students.

Day 1:

The students were introduced to the skill, and the importance of the skill in making decisions was explained. After that, the students were paired up to do the exercises. The students were given situations. For each situation, they need to find out the irrelevant option among the four options given.

In exercise I, item no. 3 (See Lesson 10 in Appendix 3) caused considerable discussion in the classroom. In this item, the students were required to find the irrelevant detail related to attending a relative’s wedding. Some of the students argued that knowing the house addresses of the bride and the bridegroom was relevant. Then the teacher’s question—Can’t you go to the wedding if you do not know their addresses?—helped solve the argument. The students, then, understood how to distinguish between the relevant and the irrelevant.

In exercise II, the students were given brief conversations in which the students were to find the irrelevant part of the answer given by one of the persons. The students were very comfortable in writing the irrelevant answers.

Day 2:

The importance of distinguishing the relevant from the irrelevant was emphasized again. The students formed pairs to do exercise III, where they were given the physical description of four people. They were expected to find out the part of the description that is not related to physical description. The students did not find any problem in doing the exercise.

In making a decision, students have to know what information is relevant to them. At the same time, they should also be able to develop their criteria based on which they can make their decisions. Therefore, they need to be taught how to develop criteria in decision-making.
3.8.11 **Developing criteria (L11) (2 days)**

In making a decision, one has to develop criteria based on which one would evaluate the options or alternatives available. The lesson contains two parts: A and B. Part A contains 2 and Part B contains 5 decision-making situations.

**Day 1:**

The students were explained the importance of generating criteria in the instances of decision-making. To lead them into the skill, a collaborative activity was conducted taking the first task in (A), i.e., *purchasing a pen*. The students were asked to mention the steps in purchasing a pen. These were written on the board by the teacher and were arranged in sequential order. The purpose of this activity was to provide a warm-up so that they could think of all the possible criteria. For this task, the following steps were collated from students’ oral responses. The sentences given below are the uncorrected version.

a) I will go home and take away. (1)
b) I will go the shop. (2)
c) I will ask the merchant to show me pens. (3)
d) I will see the colour of the pen. (4)
e) I will see its nib. (5)
f) I will buy it. (12)
g) I will see its company and model. (6)
h) I will see ask its price (7)
i) I will see its design. (8)
j) I will see its size. (9)
k) I will see whether its writes or not. (10)
l) I will see whether it has cap or switch pen. (11)

It should be noted that the students were taught the modal auxiliary *will* implicitly.

When ordering these steps, there were multiple perspectives from the students. Some of the students gave priority to price whereas others gave importance to design while some others thought company and model was important. The teacher
utilized this situation to let the students realize that people differ in their priorities and so they have different criteria. So, each student was asked to prioritize the steps in the purchase of a pen based on his/her personal preferences. The steps mentioned above were written by one of the students and the sequence was the student’s personal preference.

Day 2:

Taking a lead from the previous class, the students were given a handout that consists of five decision-making instances. They were asked to list four criteria in the case of each instance. They should also rank order them. For this, the students were paired up for discussion and they were expected to arrive at some criteria logically. They were given 15 minutes. Then each pair was asked to present the criteria developed to the class. When the students raised a few questions, the teacher moderated the discussion. In this way, all the five situations were completed.

3.8.12 Considering multiple perspectives (Lesson 12) (3 days)

Philosophers argue that all reasoning is done from some point of view. Therefore, it is essential that one needs to know one’s point of view on an issue, seek other points of view and identify their strengths and weaknesses, and be fair-minded in evaluating all points of view. Hence, the disposition to consider other people’s views or others’ perspectives is necessary for an effective thinker. Lesson 12 contains 3 situations where the students were asked to view the situation from different groups of people. The aim of this lesson was to help the students realize that there would be multiple perspectives to an issue, i.e., what is good for somebody might be bad for another, what is right for somebody might be wrong for another, etc.

Day 1, 2, & 3:

On each day, the class began with the emphasis on importance of the thinking disposition in their personal and professional lives. 10 minutes was given for each pair to think of the possible consequences for different sets of people. Pair work followed by discussion was the method used for handling this lesson. Each pair was asked to give the consequences and these were discussed in the class. The teacher acted as a moderator for this discussion.
Three situations were given to them (See lesson 12 in Appendix 3). Situation A was about imagining consequences in the event of increase in a pencil's price. Situation B was related to writing consequences from multiple perspectives in the case of a bomb blast in Hyderabad. In situation C, the students were asked to write the consequences to different groups of people when cigarette smoking is banned. Each situation took one class. In the case of situations A and B, the stakeholders or the people who are influenced by the situation were given but in C, the students were asked to think about who would get affected and how they view the situation.

The situations were so stimulating that they could relate to the situation A very easily; they had the immediate knowledge of situation B, which took place a few days before; and they see anti-smoking publicity, in the case of situation C, everywhere in the vicinity.

With Lesson 12, all the skills and dispositions that were needed by the students were taught except for metacognitive thinking. The lessons on metacognition were taught as last lessons for two reasons:

1) Since teaching thinking explicitly was new to the students, to get them involved in the learning processes was difficult. Therefore, metacognitive lessons were dealt with at the end of the intervention so that the students would gradually be involved in learning higher level thinking skills, i.e., metacognitive thinking.

2) Second, it was thought that if metacognitive lessons were taken up in the end, it would be much easier to reflect on the tasks they have done in the previous lessons.

3.8.13 Metacognition (M1) (Lesson 13) (2 days)

Metacognition refers to the knowledge of one's own cognitive processes, the active monitoring and regulation of these processes. Simply put, thinking about thinking is metacognition. In this lesson, to raise awareness about the concept of metacognition, two tasks requiring KWL strategy were used. The KWL strategy allows students to reflect on what they already knew and what they want to know. Students can categorize information about the topic that they expect to use. The K-W-L strategy stands for what I Know, what I Want to learn, and what I did Learn. By
activating students' background knowledge, it improves comprehension of expository text. This strategy was used in the Metacognitive lessons.

**Day 1:**

The term *metacognition* was introduced to the students. To lead the students to think metacognitively, the teacher wrote AADHAR CARD on the board and three columns in which K-W-L were written in those three columns. The teacher took the first column ‘What I know’ and asked the students to talk what they knew about AADHAR card. The teacher wrote the students' responses on the board as given below: *(The examples given below are the exact responses. They were corrected by the teacher later)*

**Student 29**

<table>
<thead>
<tr>
<th>(K)</th>
<th>What I Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>All family photos</td>
</tr>
<tr>
<td>2)</td>
<td>One for one person</td>
</tr>
<tr>
<td>3)</td>
<td>Everyone should have</td>
</tr>
<tr>
<td>4)</td>
<td>Personal Information</td>
</tr>
<tr>
<td>5)</td>
<td>Government give it</td>
</tr>
</tbody>
</table>

Since the strategy emphasizes individual’s awareness levels, the students were asked to add other aspects that they knew about AADHAR in their notes. On this day, K-part of KWL strategy was discussed and the rest was to be taught the next day.

**Day 2:**

On the 2\textsuperscript{nd} day, the teacher reviewed the concept of metacognition. Later, the teacher wrote in the second column under the heading ‘What I want to know’. Collecting responses from the students on what they want to know about AADHAR, the teacher filled the second column. The responses of the students were written in question form in the column given below. *(The examples given below are elicited from the students. They were written on the board by the teacher after making corrections)*
What I want to know

1) What is the use of Aadhar?
2) Is it given for people of all religions?
3) Is it useful in Indian and foreign countries also?
4) Why do they take finger prints, photo, and iris scan?
5) Will they give a second card if we lose it?
6) Is second time also free?
7) Why should we go personally to get Aadhar card?
8) Why only the Government is providing Aadhar?
9) Why only one card for each person?
10) Why should we fill a form?

In the above examples, it should be noted that the students were taught the use of interrogative sentences implicitly.

After the two columns were filled, the teacher gave a passage in which information about Aadhar card was given to them. The students were asked to read the passage silently. After reading the passage, they were asked to say what they learnt. With their responses, the third column with the heading ‘What I learnt’ was filled in by the teacher as in the following table. (The examples given below are the exact responses. They were corrected by the teacher later)

What I learnt

1) Open bank account book e-tickets take passport.
2) For a person any age.
3) Give by UIDAI.
4) Useful as identity card
5) it is 12-digit number  
6) fingerprints and iris scan  
7) valid for whole life  
8) The number not change  
9) One for one person  
10) stored centralized database  

This activity covered the awareness of their knowledge on a particular topic. Though this strategy cannot cover all the aspects of metacognition, this was a good beginning to lead the students into other aspects of metacognition such as metacognitive monitoring.

This was followed by task 2 where the students were asked to write down what they know and want to learn about snakes using the KWL chart. Followed by this, they were given a reading passage about snakes. The passage contained interesting facts about snakes to stimulate the motivation of the students. After they read the passage, they were asked to write what they learnt about snakes from the reading passage.

3.8.14 Metacognition (M2) (Lesson 14) (2 days)

This lesson dealt with the metacognitive processes of planning, monitoring, and evaluating the task performance. It contained two tasks. Task 1 has three parts—a reading passage, a table, and a graphic organizer. The students were to read the passage to fill the information in the graphic organizers given and later write their metacognitive experiences of the task performances.

Task 2 had two pictures. Students should observe the two pictures and write a factual description. After that, they should write their metacognitive experiences of the task performance. The teacher took up task 1 on day 1.

Day 1:

The teacher introduced to the students the processes involved in metacognitive processes. With the help of a checklist of questions that help them think about those
processes, the teacher attempted to lead them into metacognitive thinking. The questions are as follows.

**Planning**

1. What is the nature of the task?
2. What is my goal?
3. What kind of information and strategies do I need?
4. How much time and resources will I need?

**Monitoring**

1. Do I have a clear understanding of what I am doing?
2. Does the task make sense?
3. Am I reaching my goals?
4. Do I need to make changes?

**Evaluating**

1. Have I reached my goal?
2. What worked?
3. What didn’t work?
4. Would I do things differently next time?

The students were asked to read the article on frogs and toads. Later, they were asked to form pairs to fill the graphic organizers. Then, using the checklist of questions given above, they were asked to articulate the metacognitive processes. The teacher elicited their responses and wrote them on the board after making necessary corrections.

**Planning**

1) I read the passage.
2) I understood the passage.
3) I drew the table.
4) I filled in the table.
5) I drew two circles (Graphic Organizer).
6) I wrote similarities and differences.

**Monitoring**

1) I did not understand habitat.
2) I had difficulty with overall appearance.
3) Drawing graphic organizer was interesting.
4) I learnt that there are different types of frogs.
5) Graphic organizer tool: a lot of time.

**Evaluating**
1) I did not draw circles well.
2) I did not know what to write for overall appearance.
3) I read the passage very well.
4) I enjoyed doing graphic organizer.
5) Table was easy.

Here, it can be observed that there is implicit teaching of the capitalization of *I*. Though the teacher modeled using a student's (S11) responses, the students were asked to write their own metacognitive experiences of task performance.

While task 1 was performed by students on day 1, task 2 was to be completed on the following day.

**Day 2:**

The class began with a review of the metacognitive processes. The students were given two pictures and asked to write a paragraph giving a factual description based on the two pictures. After that, they were asked to write their metacognitive experiences of the task performance. The response of one of the students is given below:

**Planning**
1) By seeing the picture I have planned
2) I understood the picture very will
3) I wrote the passage

**Monitoring**
1) I did not understood the man is swimming or floating
2) I did not understood that how is that man stood there
3) I learnt how to make passage by seeing picture

**Evaluating**
1) I enjoyed by see and writeing the passage

This lesson being the last, the classroom intervention process ended. On the whole, students considered the intervention to be very useful. In the informal interaction after the intervention, the students talked about their learning experiences.
Most of them said that they liked the lesson related to *distinguishing between facts and opinions* the most. Some other students expressed that it was difficult to think metacognitively.

Later, it was decided to conduct an interim assessment to understand how far the students had learnt the thinking skills and dispositions in the intervention lessons. Therefore, an Assignment containing 10 tasks was prepared. Further, the tasks in the Assignment were to reflect their learning processes in the intervention.

### 3.9 Assignment

In the intervention process, the class work and home work of all the 30 students was documented. As part of the study, each student worked out as many as 63 items and 32 tasks excluding Pre-intervention Assessment (5 tasks), Assignment (10 tasks) and Post-intervention (5 tasks). Consequently, the total number of items to be analyzed was 1,890 and the total number of tasks to be analyzed was 960. Therefore, it was decided to give the students an Assignment (See Appendix 4), which contained the tasks representative of the learning processes in the intervention process. Thus, the tasks in the Assignment covered all the lessons taught in the intervention.

<table>
<thead>
<tr>
<th>Task</th>
<th>Learning Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Identifying properties and characteristics</td>
</tr>
<tr>
<td>2.</td>
<td>Identifying similarities and differences</td>
</tr>
<tr>
<td>3.</td>
<td>Categorizing</td>
</tr>
<tr>
<td>4.</td>
<td>Representing</td>
</tr>
<tr>
<td>5.</td>
<td>Identifying conclusions, premises, and assumptions</td>
</tr>
<tr>
<td>6.</td>
<td>Distinguishing between facts and opinions</td>
</tr>
<tr>
<td>7.</td>
<td>Distinguishing between relevant and irrelevant information</td>
</tr>
<tr>
<td>8.</td>
<td>Developing criteria</td>
</tr>
<tr>
<td>9.</td>
<td>Considering multiple perspectives</td>
</tr>
<tr>
<td>10.</td>
<td>Metacognitive Thinking</td>
</tr>
</tbody>
</table>

Table 3.4 Skills covered in the Intervention and the Assignment
The students were asked to do the assignment by referring to the tasks done in the intervention lessons. Table 3.4 gives a clear overview of the lessons covered by each task in the Assignment.

The students completed the Assignment and their responses were collected for compilation and analysis. The students were asked to review the skills and dispositions they had been taught in the intervention. They were informed that there would be a comprehensive assessment after a week. On the allotted day, the Post-Intervention Assessment was conducted.

3.10 Description of the Post-Intervention assessment

In the Assignment, the tasks were to be a representative sample of the learning processes related to the skills and dispositions learnt in the intervention. But the tasks in the Post-Intervention assessment were comparable to the tasks in the Pre-Intervention Assessment. While the Assignment was to reveal the learning processes, Post-intervention assessment was conducted to document the effectiveness of the intervention process.

The objective of this assessment was to evaluate the effectiveness of the Intervention study undertaken in the research study. Similar to the Pre-Intervention Assessment (PRI), the Post-Intervention Assessment (POI) contained the following tasks—Task 1(A), Task 2(A), Task 3(A), Task 4(A) (i) and (ii), and Tasks 1(B), 2(B), 3(B), 4(B) (See Appendix 5).

Tasks 1(A), 2(A), and 3(A) were related to thinking skills, Task 4(A) (i) and (ii) were related to thinking dispositions, and Tasks 1(B), 2(B), 3(B), and 4(B) were questions that assess their metacognitive thinking. The following table depicts the tasks and thinking skills and dispositions in those tasks.

<table>
<thead>
<tr>
<th>Task</th>
<th>Skill/Disposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 1(A)</td>
<td>• Ability to organize information</td>
</tr>
<tr>
<td>Graphic Organizer</td>
<td>• Ability to make categories</td>
</tr>
<tr>
<td>Task 2(A)</td>
<td>• Ability to use an appropriate graphic organizer</td>
</tr>
<tr>
<td></td>
<td>• Ability to identify conclusions</td>
</tr>
</tbody>
</table>
The total time allotted was 3 hours and the students were to adjust the available time among the tasks. In the following sections, the descriptions of these tasks are provided. The tasks in POI were designed to be similar to those in PRI as to make comparisons possible. The thinking skills and dispositions assessed in both the assessments are similar.

3.10.1 Task 1(A) Graphic organizer

The students had to read the passage about Antarctic region and present the information from the passage in a graphic organizer. The skills assessed through this task were the ability to organize the information, and categorize the information under headings. The students should have an estimation of how many categories of
information can be made out of the passage in order to draw the diagram neatly and effectively.

3.10.2 Task 2(A) Critical thinking

The task included a short passage in which Sudheer's sister concludes that Sudheer would receive punishment because he hit her that morning. The students, in answering whether that conclusion was right or wrong, needed to justify their answers. To do so, they should demonstrate their ability to identify conclusion, premises, and assumptions. Since the information given was insufficient to conclude about the cause of the accident, the students were expected to imagine other possible causes for proper explanation of their view.

3.10.3 Task 3(A) Problem solving and Decision making

The task included 1) Information about the two television sets—Weston TV and Bush TV; 2) Personal opinions of other people regarding these TVs. In the first component, the information about the two TVs was given by the salesman. It had a comparative description of the features available in both the TVs. The second component constituted the personal opinions of the friends who used or had knowledge of the TVs.

The students were asked to read the information and the personal opinions to write a response explaining which TV the students would prefer to buy. For making the decision of buying, they should identify similarities and differences between the two TVs, distinguish between facts and opinions, develop criteria, evaluate the features of the phones against the criteria, and select the best alternative.

3.10.4 Task 4(A) (i) and (ii) Thinking dispositions

This task, which contains two items, was designed to assess the thinking dispositions.

In task 4(A) (i), Raj went to a merchant and bought goods his parents asked him to buy. He paid for them without seeking further clarification about the increased prices. An inquiring disposition was expected to be exhibited by the students. The
students should imagine that they were Raj and explain what they would do in such context.

In task 4(B) (ii), Arpita, Sukanya and Poojitha argue with each other regarding which is the most beautiful colour of flowers: pink, white, or yellow. The students were asked to express their opinions regarding who was right among the three friends. The students were expected to consider the issue from multiple perspectives. The students were expected to appreciate the subjectivity involved in that beauty is relative and it is purely a personal opinion and there cannot be a perfect answer.

3.10.5 Tasks 1(B), 2(B), 3(B), 4(B) Metacognitive thinking

As in the Pre-Intervention, with the help of these questions, it was examined how far the students were able to articulate their experiences of task performance. In other words, their metacognitive monitoring and evaluating processes were analyzed.

On the whole, the skills and dispositions assessed in the Post-Intervention are the same as those in the Pre-Intervention. The Post-Intervention was conducted and the students' scripts were collected for analysis. Specific criteria were developed for assessing the responses. Using these criteria separate rubrics were designed for each of the tasks since each task assesses different skills or dispositions. The responses of the students to Post-Intervention were analyzed and a detailed account of the analysis will be presented in the next chapter.

3.11 Conclusion

In the above sections, we have discussed various elements in the research methodology adopted for the study. The chapter presented a sequential account beginning with the description of the environment and the context of the study to the post-intervention stage. The findings of the Pre-intervention assessment are presented in chapter 4 because it would be easy to understand the student development from Pre-Intervention to Post-Intervention.

In the Pre-Intervention assessment, two thinking dispositions were assessed, i.e., inquiring attitude, and considering multiple perspectives. However, in the intervention lessons, only one thinking disposition was covered. This was done to see
whether the students would be able to demonstrate their attitude to inquire as a result of learning in all the lessons, given the fact that the importance of an inquiring attitude would be discussed in a few tasks in the intervention lessons.

The analysis of the tasks in the Assignment and the rubrics used for the analysis will be presented in chapter 4. We will also look at the detailed analysis of the written responses to the tasks in the Pre-Intervention, the Assignment, and the Post-Intervention.