Chapter III

Research Methodology

This study investigated the effects of Reciprocal Teaching on the English Reading Comprehension of the first year B.E./B.Tech students studying in 5 different engineering colleges affiliated to Anna University, Chennai, Tamil Nadu. It also examined whether Reciprocal Teaching enhanced the proficient and less proficient students’ English reading ability.

The research methodology used in this study consisted of a mixed method approach that combines both the quantitative and qualitative data collection analysis. The quantitative part of this experimental study was designed to examine the effects of Reciprocal Teaching on first year students’ English Reading Comprehension, and the exploratory study was used to investigate the students’ use of Meta cognitive reading strategies in reading English texts. For its part, the qualitative aspect of this study analyzed the data collected from the transcriptions of dialogues performed during the Reciprocal Teaching, and a Reading Thinking Aloud Sheet.

This chapter then describes the research design, the participants, and the setting of the study and its variables. It also describes the instruments used for collecting the data and procedures for the collection of the data, including the Reciprocal Teaching method and the skill-based teaching method. The data analysis together with the statistical procedure is also discussed at the end of this chapter.
3.1 Research Design

This study used a mixed-method approach combining quantitative and qualitative data collection and analysis. The participants of this study consisted of 600 first year engineering students from 5 different engineering colleges, which are affiliated to Anna University, Chennai. In short they are Anna University students studying in different engineering colleges under the same syllabus and curriculum.

In each of these 5 engineering colleges 120 students were selected to participate in the research who were randomly assigned into two groups: an experimental group (60 students) and a control group (60 students) thus including all the 5 colleges, a total number of 600 students participated in the study.

A model of Reciprocal Teaching for reading instruction was constructed to investigate its effects on the participants’ reading comprehension. Before the actual implementation of this reciprocal teaching model, a reading pretest was administered to the participants of both groups in each college to examine their English reading proficiency. Following this, the experimental group was instructed to read through reciprocal teaching, while the control group was taught by skill-based teaching. The researcher instructed the students of both groups in each college for four weeks. During this period, the qualitative data, the transcriptions of the dialogues between the teachers and the participants and the participants and their peer, were collected through a Reading Think Aloud Sheet.

After Reciprocal Teaching, a posttest by using the same pretest material was administered to both groups in each college to investigate whether the participants improved their reading comprehension and to investigate whether the participants
improved their reading comprehension and to investigate whether reciprocal instruction enhanced the proficient and less proficient students’ reading ability.

To investigate the Meta cognitive reading strategies, the participants in the experimental group used before and after Reciprocal teaching, a Reading Strategies Questionnaire was administered to them prior to and after receiving instruction on Reciprocal teaching. Also, all the participants in the experimental group were interviewed after completing the questionnaires. The data obtained from the participants’ self report in the Reading Strategies Questionnaire were then triangulated with the data found in the retrospective interviews. All the data obtained from the above mentioned research instruments were analyzed both quantitatively and qualitatively in relation to the research questions.

Fig. 3.1 Procedure of the study
3.2 Context of the study

Anna University was established on 4th September 1978 as a unitary type of University. It offers higher education in Engineering, Technology and allied Sciences relevant to the current and projected needs of the society. The Anna University, which is of the affiliated type is a member of the Association of Indian Universities, the Association of Commonwealth Universities and Partner of UNESCO International Center for Engineering Education (UICEE). UGC has accredited Anna University with Five Star Status which is the highest rating. With proven capabilities both in academic and research areas, Anna University is able to receive this honour for excellence in Technical Education. Since December 2001, it has become a large, highly renowned Affiliated University, having brought into its fold about 426 Self-financing Engineering Colleges, six Government Colleges, and three Government-aided Engineering colleges located in various parts of Tamilnadu State, India.

The researcher selected 5 engineering colleges affiliated to Anna University, Chennai, after exploring the possibilities of conducting research. These engineering colleges come under Zone II of Anna University jurisdiction. The researcher obtained permission from the engineering colleges to conduct the research by sending them formal letters that included the research proposal to be considered. The college administrations officially granted permission and allowed the research to be conducted in the second semester of the academic year 2011-12.

3.2.1 Target Population

The target population of this study constituted 5 Anna University affiliated engineering college students, admitted to the first semester in different engineering
disciplines, taking the course Technical English-II (HS2161) according to the Anna University regulations 2008 (R 2008).

3.2.2 Participants

The participants of this study were formed by 600 students selected from 5 different engineering colleges under Anna University affiliation. 120 students from each college were selected from different engineering disciplines and were given a separate class room to conduct the research in every college. The students were enrolled to the core paper Technical English-II at Anna University, Chennai. They were all native Tamil speakers of both genders.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Name of the Engineering College</th>
<th>Stream</th>
<th>Boys</th>
<th>Girls</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Meenakshi College of Engineering</td>
<td>CSE</td>
<td>80</td>
<td>40</td>
<td>120</td>
</tr>
<tr>
<td>2</td>
<td>SKR Engineering college</td>
<td>MECH</td>
<td>120</td>
<td>-</td>
<td>120</td>
</tr>
<tr>
<td>3</td>
<td>Sree Sastha Engineering College</td>
<td>ECE</td>
<td>90</td>
<td>30</td>
<td>120</td>
</tr>
<tr>
<td>4</td>
<td>Alpha College of Engineering</td>
<td>CSE</td>
<td>75</td>
<td>45</td>
<td>120</td>
</tr>
<tr>
<td>5</td>
<td>Apollo Engineering College</td>
<td>EEE</td>
<td>80</td>
<td>40</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>395</strong></td>
<td><strong>205</strong></td>
<td><strong>600</strong></td>
</tr>
</tbody>
</table>

3.2.3 Sampling Procedure

At the time of study, all the students in Anna University were doing I year, II semester and enrolled for Technical English – II (HS2161) subject. The selected 600 students in all the 5 engineering colleges received a Pretest and were purposively selected as the Experimental and Control groups according to the similarity of their
mean scores. Therefore, before receiving the instruction, English reading proficiency of the participants in both groups was similar. Out of 120 selected students in each college, 60 students were randomly assigned as an experimental group and the other 60 as a control group. Thus 120 students in each college and an overall of 600 students in 5 engineering colleges participated in the study.

The students were informed that they were selected to participate in a research, and they agreed to do so. They also allowed the data and the scores from the reading test to be used anonymously. The participants in the Experimental group were taught to read through the Reciprocal teaching model for Reading Comprehension, whereas the participants of the Control group were instructed through skill-based teaching.

The Experimental group was divided into subgroups of six participants according to their final scores in the Technical English – I (HS2151) subject of the first semester of the academic year 2011-12. The students’ grades on this subject ranged from the highest to the lowest and the first 30 students in each group were defined as proficient students and the thirty first to sixtieth students as the less proficient ones. So, each sub-group of six students consisted of three proficient students and three less proficient students.

3.2.4 Confidentiality of the participants and their responses

The participants were asked to use their identification numbers rather than their names to identify themselves on the tests and on the questionnaires. The researcher corrected the test sheets, the scores were sent directly to the participants and their personal information was destroyed immediately after the completion of the study.
3.3 Research Procedures

The instruments used in this study included: English Reading Comprehension Test, Reading Strategies Questionnaire (RSQ), Reading Materials for Reciprocal Teaching and Skill-based Teaching, and the Reading Think Aloud Sheet.

3.3.1 Research Instrumentation

English Reading Comprehension Test

The English Reading Comprehension test was mainly chosen from the collections of Online Communication Skills Test examinations, which is a standardized measure designed and authorized by Anna University to examine students’ English proficiency. The Online test has three parts: Reading Comprehension, Listening Comprehension and Common Errors in English. In this study, only the Reading Comprehension part of the online test was used as both the pre-test and post-test. (see Appendix A)

The test used for the study involved 40 multiple-choice questions with a total score of 100. The goal of pre-testing was to ensure that English reading proficiency for both groups was equivalent so that there was no significant difference before the students received different teaching methods. After twenty days of continuous teaching intervention, students needed to complete a post-test, whose purpose was to compare the differences in reading performance for both groups. The questions of the post-test were same of the pre-test because the researcher could compare the students’ performance in the experimental and control groups. However, students were not allowed to give the examination paper nor check the answers, to preclude interference with the results of the study.
Reading Strategies Questionnaire (RSQ)

The purpose of the Reading Strategies Questionnaire was to investigate the metacognitive reading strategies the participants employed in reading. The researcher developed and adapted the RSQ from Anderson’s questionnaire (2003) and Phakiti’s questionnaire (2003). Phakiti’s original questionnaire consisted of 40 items and was used to investigate the reading strategies students used while taking exams. Anderson’s original questionnaire, on the other hand, counted 15 items and was used to investigate students’ cognitive and metacognitive reading strategies. The three main metacognitive reading processes of planning, monitoring, and evaluating were the 20 strategies that students used in English reading texts, as presented below in Table 3.1. The questionnaire was also used to examine students’ reading strategies in the three main stages of reading: pre-reading, while-reading and post-reading.

To develop the RSQ, the researcher selected only the strategies that were related to the four main strategies of reciprocal teaching: predicting, clarifying, questioning, and summarizing. Therefore, the questionnaire was applicable to the present study which aimed to explore the use of the metacognitive reading strategies through reciprocal teaching.

The RSQ consisted of 20 items and was divided into three parts. The first part of the questionnaire intended to obtain information about the reading strategies the students used before reading texts; the second part aimed at eliciting the reading strategies they used in the while-reading stage; and the last part investigated the reading strategies they used in the post-reading stage.
This questionnaire used a five-point rating scale (1-5) built according to the frequency of use of the metacognitive reading strategies by the participants. It was administered to the experimental group before and after the implementation of reciprocal teaching (see Appendix B).

Following the three main metacognitive processes of planning, monitoring, and evaluating, the 20 reading strategies that the students used can be organized into 10 metacognitive strategies in three processes of metacognitive, as presented below:

**Table 3.2: Description of the Metacognitive Strategies and Number of Related Items in the Reading Strategies Questionnaire**

<table>
<thead>
<tr>
<th>Metacognitive Process</th>
<th>Metacognitive Reading Strategies</th>
<th>Description</th>
<th>Item(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Planning</td>
<td>Prediction</td>
<td>Anticipate the information to prepare for and give direction to the task.</td>
<td>1, 2, 4</td>
</tr>
<tr>
<td></td>
<td>Background Activation</td>
<td>Think about and use what is already known to help perform the task.</td>
<td>6, 7</td>
</tr>
<tr>
<td></td>
<td>Self-Management</td>
<td>Arrange for conditions that help reading.</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Goal Setting</td>
<td>Develop personal objectives; identify the purpose of reading.</td>
<td>18, 3</td>
</tr>
<tr>
<td>2. Monitoring</td>
<td>Note-Taking</td>
<td>Write down important words and concepts.</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Inferring</td>
<td>Make guesses based on previous knowledge, using logic or contextual clues.</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Selective Attention</td>
<td>Choose to focus on specific aspects of situational details that will help with the reading task.</td>
<td>9, 11, 12, 17, 20</td>
</tr>
<tr>
<td>3. Evaluating</td>
<td>Verifying Prediction</td>
<td>Confirm the predictions/guesses are correct.</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Self-Evaluation</td>
<td>Judge how well the materials were understood and evaluate the reading strategies used.</td>
<td>14, 19</td>
</tr>
</tbody>
</table>

(Adapted from Chamot, Robbins, El–Dinary, & Barnhard, 1999; Flavell, 1979; and Wenden, 1991)
This questionnaire was constructed based on the specific strategies of the reciprocal teaching approach. The research advisor and three experienced teachers in English reading examined it for any ambiguous wordings, the appropriateness of its content, and whether the content of each item was related to the purpose of the research. To establish its validity and reliability, the RSQ was piloted with 30 first year students at Panimalar Engineering College who did not take part in this study.

**Reading Think Aloud Sheet**

The Reading Think Aloud Sheet was constructed by the researcher on the basis of the reading process using the four main strategies of reciprocal teaching. It consisted of a worksheet that helped the participants write down the reading strategies they used and what they did while reading, such as their predictions from the title or for the next paragraph, the main ideas of each paragraph, the questions they asked on the content of a paragraph, the words or phrases and references that they clarified, and a brief summary of what they had read. The correctness and appropriateness of the Reading Think Aloud Sheet was verified by English experts and the research advisors (see Appendix C).

**Interviews**

Interviews of the experimental group were used after reciprocal instruction in order to confirm the quantitative information collected from the previous tools. The interviews were to help the researcher retrieve the information from the analysis of the participants’ answers on their use of the four meta-cognitive reading strategies of reciprocal teaching when reading. The interview questions were piloted and reviewed for the validity of their content by the research supervisor. The questions were then revised based on his comments (see Appendix D).
3.3.2 The Construction of the Research Instruments

The validity and reliability of the research instruments used in this study (the Reading Comprehension Test, the Reading Strategies Questionnaire (RSQ), and the Reading Think around Sheet) were verified before these instruments were used in the actual study in the second semester of 2010. Following this, the whole process of reciprocal teaching for reading comprehension was piloted.

Verification of the reliability of the English Reading Comprehension Test

Since there was no reliability coefficient available for the test, the researcher performed a pilot study on the reading part with 60 first year students at Panimalar Engineering College, none of which participated in this study.

In addition, the purpose of the pilot study was to establish the reliability of the test and to determine its difficulty values and the discrimination values. The results from this pilot study revealed that the mean scores for the reading part of the students were 15.04 out of 40, which is less than 50 percent of the total scores. Additionally, the data were analyzed for the difficulty and the discrimination values. Fraenkel and Wallen (2000) stated that the satisfactory criterion for difficulty values range between 0.20 and 0.80, and that acceptable values for discrimination are more than 0.20. The difficulty values as collected from the pilot study ranged from 0.20 to 0.50, and the discrimination values stood at more than 0.20. From these results, it can be concluded that the students were not familiar with this test and that it was an appropriate tool to discriminate good readers from poor ones.
As for the test reliability, Fraenkel and Wallen (2000) state that the reliability coefficient of the reading part of the test should be at least 0.70. In this pilot study, the reliability of the test stood at 0.80. This indicated that the English reading comprehension test was reliable according to the Kuder- Richardson Formula 20.

In this study, all the participants in the experimental and the control groups were submitted to a pretest on the first week of the course. In order to control the internal validity, the length of time between the pretest and posttest was 6 weeks, a period long enough to prevent the participants from remembering the pretest.

**Verification of the reliability of the Reading Strategies Questionnaire (RSQ)**

The Reading Strategies Questionnaire (RSQ) was piloted with 30 first year students at Panimalar Engineering College who did not take part in this study. Fraenkel and Wallen (2000) stated that the criterion for coefficients of acceptable coefficients should be at least 0.70. The results from the pilot study showed that the reliability coefficient of the RSQ reached 0.72. This indicated that the Reading Strategies Questionnaire was reliable according to the Kuder-Richardson Formula 20.

### 3.3.3 Lesson Plans and Teaching Materials

**Lesson plans**

The lesson plans for both the experimental and the control groups were created based on the objectives and goals of the course Technical English - II (HS2111) of Anna University. The instruction for both groups was divided into three stages: pre-reading, while-reading, and post-reading (see Appendix E).
Teaching materials

The teaching materials consisted of 8 lesson plans and 10 reading passages which were adapted to meet the purpose of the study. English reading experts and the research advisor evaluated them for any ambiguous wording and inappropriateness. The reading materials were taken from English for Engineers and Technologists (combined edition, Volume 1 & 2) recommended by Anna University. Additionally, the researcher selected 10 passages from various sources based on the participants’ level of English and interests, and from various fields. They consisted of eight passages for reading in the classroom and two passages for assignments. The following is the list of these 10 reading passages:

Reading 1  Evaluating Technology
Reading 2  Computer in India
Reading 3  Robot
Reading 4  Media
Reading 5  Transport Tomorrow
Reading 6  Human Resource
Reading 7  Nuclear Power
Reading 8  Our Living Environment
Assignment 1  Human Dynamics
Assignment 2  Quality of Life

3.3.4 Teaching Procedures

The researcher instructed both the experimental and the control groups for two periods (100 minutes) per day, over a 20-day (4 weeks) period, using eight reading passages for in-class tasks and two reading assignments to be worked at home.

In order to prevent any threats to the internal validity of the research, the researcher used the same reading materials, the same activities, the same length of
teaching time, the same classroom environment, and the same examination. However, the two groups were instructed through different teaching techniques. But even so, the researcher made clear to both groups that the instructions used in this study were efficient teaching techniques that had been designed to improve English reading.

The experimental group was instructed through reciprocal teaching, whereas the control group was taught through skill-based teaching. In English classes at college level, the teachers generally use skill-based teaching. In this study, the researcher compared the effects of reciprocal teaching to those of skill-based teaching.

3.3.5 The Reciprocal Teaching Model for Reading Comprehension

In this study, the teaching procedures for the reciprocal teaching instruction to the experimental group consisted of four stages: the preparation, the modeling, the participation, and the cooperative stages. The following is a more detailed description of these four stages.

Stage 1. The preparation stage

The students were taught what the four main strategies were and how to use them. They practiced each strategy through the worksheets provided by the teacher.

Stage 2. The model stage

Here, the teacher modeled the whole process of the reciprocal approach, while the students learnt what strategies to use, and when and how to use each of them.
Stage 3. The participation stage

At this point, the teacher acted as the reading leader for the first paragraph of a passage. Following this, the students worked in small groups, read the next paragraph, and a volunteer came out and acted as the leader in front of the class.

Stage 4. The cooperative stage

The students worked in groups organizing the whole process of reading by using the reciprocal teaching approach. At this stage, each of the cooperative groups followed these steps:

1) One student acted as the leader and asked the group members to predict the content of the passage from its title, subtitles, or pictures.

2) The leader asked the group to read a paragraph silently.

3) The leader asked questions on the important information of the paragraph.

4) The leader might have clarified or asked the members to clarify difficulties with vocabulary, references, and confusing sentences or phrases.

5) The group leader asked the members to locate the main idea of the first paragraph or told what this main idea was, and summarized it.

6) The group leader asked the members to predict the likely content of the next paragraph.

7) The leader asked for a new volunteer leader for the next paragraph.

8) The new group leader performed the same process, from step 2 to step 7.

9) After the last paragraph, the last group leader asked the members to summarize the whole text and to do the exercises.
All throughout this last stage, the teacher acted as a facilitator, helping the students who needed it. Moreover, the students had a chance to read and practice on their own by working on three assignments, two of them provided by the teacher and the other selected by themselves.

Figure 3.2 Reciprocal Teaching Model for Reading Comprehension
3.3.6 Skill-based Teaching for Reading Comprehension

The control group was instructed to read using the skill-based approach. There are three stages in skill-based teaching: the pre-reading stage, the while-reading stage, and the post-reading stage. In each of them, the participants practiced using the following skills useful in increasing their reading abilities: finding the topic, finding the main idea, finding and inferring details and facts, drawing inferences, explaining vocabulary, and explaining sentence structures and grammar points.

In the pre-reading stage, the teacher explained the background information related to the text. The unknown key words and a few grammar points and structures were explained and reviewed with the students.

In the while-reading stage, the teacher told the students to read the text on their own. The readers were encouraged to find the main idea, to find and infer details and facts, and to draw inferences. If they met with difficulties, the teacher assisted them in comprehending the text by explaining the contentious points.

In the post-reading stage, the teacher asked the students to answer questions and guided the learners into the activities or exercises accompanying the materials.

In conclusion, reciprocal teaching and skill-based teaching both have a reading process that includes the three steps of pre-, while-, and post-reading. In addition, in both reciprocal and skill-based teaching in this study, the students were asked to find the main idea and the important content of a passage, to clarify the difficult words, phrases, and references, and to complete the exercises after
reading. However, the role of the teacher and the stages of reading in both groups were different. In skill-based teaching, the teacher organized the whole reading class and acted as a lecturer. On the other hand, in reciprocal teaching, the teacher gave the students guided practice, direct modeling, and explicit instruction, and then transferred the leading role to the students, acting as a guide and assistant giving the students a chance to participate in the reading process. In the end, the students read a passage by themselves through the three steps of reading. The teacher acted as a facilitator giving the students feedback and helping them as required. The following Table 3.2 details the summary of the elements of the reciprocal teaching and of the skill-based teaching.

**Table 3.3: Summary of Elements of Reciprocal Teaching and Skill-based Teaching in this study**

<table>
<thead>
<tr>
<th></th>
<th>Reciprocal Teaching</th>
<th>Skill-based Teaching</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Goal</strong></td>
<td>Increase reading comprehension</td>
<td>Increase Reading comprehension</td>
</tr>
<tr>
<td></td>
<td>Increase meta-cognitive awareness</td>
<td>Increase Reading Skills</td>
</tr>
<tr>
<td><strong>2. Text</strong></td>
<td>Expository</td>
<td>Expository</td>
</tr>
<tr>
<td><strong>3. Time</strong></td>
<td>20 days</td>
<td>20 days</td>
</tr>
<tr>
<td><strong>4. Instruction</strong></td>
<td>Stage 1 – Preparation</td>
<td>Skill based instruction</td>
</tr>
<tr>
<td></td>
<td>Stage 2 – Modeling</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stage 3 – Participation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Pre-, while-, and Post-reading)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stage 4 – Cooperation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Pre-, while-, and Post-reading)</td>
<td></td>
</tr>
</tbody>
</table>
### 4.1 Pre – Reading
A leader asks the group members to predict the text from the title, subtitles, and pictures.

### 4.2 While – Reading
The leader then asks the group to read a paragraph, asks questions or encourages friends to ask questions on the content, to clarify the difficult words, references, and structures, to predict the next paragraph, and to check the accuracy of their predictions.

### 4.3 Post – Reading
The participants summarize the text and do the exercises in groups.

### 5. Teacher’s Role
Guidance, assistance, and facilitation

### 4.1 Pre – Reading
The teacher explains the background information, key words, and grammar points of the text.

### 4.2 While – Reading
The students are encouraged to find the main ideas; to find and infer details and facts; and to draw inferences on the text.

### 4.3 Post – Reading
The students do the activities or exercises accompanying the text.

### 5. Teacher’s Role
Lecture

#### 3.3.7 Pilot Study

To verify the whole process of the reciprocal teaching model for reading comprehension, a pilot study was carried out in the second semester of the academic year 2011 with sixty first year students enrolled in the course Technical English – II (HS2161) in the second semester of the academic year 2011 at Panimalar Engineering College. They were randomly assigned into experimental and control groups. The participants in the control group were instructed through skill-based teaching, while the participants in the experimental group were taught through the reciprocal teaching model for reading comprehension. Both groups used the same reading materials. Before the instruction, the two groups were required to take the Reading Comprehension Test as a pretest to measure their English reading ability. Following this, only the participants in the experimental
group were asked to answer the questionnaire. While working in their cooperative group, the participants in the experimental group recorded on The Reading Think Aloud Sheet the four main strategies they used while completing the reading task. At the end of the teaching process, all the participants were required to take the same Reading Comprehension Test as a posttest in order to measure their level of achievement in English reading comprehension and to highlight any significant difference in their English reading performance.

The participants in the experimental group were asked to answer the questionnaire. The findings derived from the comparison of the mean scores obtained in the reading comprehension test between the two treatment groups indicated that the experimental group, who experienced the reciprocal teaching model for reading comprehension, obtained a higher score than the control group, who received skill-based teaching. Moreover, the results from the questionnaire show that the participants of the experimental group, who were taught through the reciprocal teaching model for reading comprehension, employed more metacognitive reading strategies after the treatment.

Studying the results of this pilot study, the researcher found some points which needed to be improved: the amount of time in introducing and practicing the four main strategies, and the Reading Think Aloud Sheet.

From the observation, the researcher found that the participants needed more time in introducing and practicing the four main strategies. Thus, the time to do so was increased from one period to two periods per day.
Finally, it was found that the Reading Think Aloud Sheet needed to be separated from the reading text in order to grasp the whole picture of each strategy. Moreover, this way was thought easier for the participants to summarize the whole text from the main idea of each paragraph. Accordingly, the Reading Think Aloud Sheet was separated from the reading text. In addition, the researcher provided the participants with instructions on how to record the strategies they used.

3.4 Data Collection Procedure

3.4.1 Collection of Quantitative Data

The procedures for the collection of the quantitative data were collected according to the research questions:

Research question 1: Do the First Year Engineering students at Anna University improve their reading comprehension after reciprocal teaching?

The data collected to answer research question 1 was formed of the scores obtained from the pretest and the posttest. It was collected from the English Reading Comprehension Test, which was administered to the experimental group before and after instruction.

Research question 2: Does reciprocal teaching enhance the English reading ability of proficient and less proficient students?

The data to investigate whether reciprocal teaching enhances both proficient and less proficient students’ reading ability were collected from the results of the pretest and posttest administration of the English reading comprehension test to the proficient and less proficient participants of the experimental group.
Research question 3: Is the increase in English reading ability of the students in the experimental group significantly higher than the increase in English reading ability of the students in the control group?

The data collected to answer research question 3 consisted of the posttest scores collected from the English reading comprehension test, which was administered to both the experimental group and the control group after instruction.

Research question 4: Do the First Year Engineering students at Anna University increase their use of meta-cognitive reading strategies after reciprocal teaching?

The answers to the Reading Strategies Questionnaire as it was applied before and after instruction were used to collect the data to answer this question. Before instruction, the participants in the experimental group were asked to complete the RSQ to explore the meta-cognitive reading strategies they employed before reciprocal teaching. At the end of the course, they were asked once more to answer the RSQ to explore whether they increased their use of the meta-cognitive reading strategies after the implementation of the reciprocal teaching model.

3.4.2 Collection of Qualitative Data

During the instruction, the students in the experimental group recorded on the Reading Think Aloud Sheet how they applied the four main strategies. The qualitative data gathered from the Reading Think Aloud Sheet supported the quantitative data collected from the pretest and posttest scores of the English reading comprehension test. In addition, the qualitative data gave support to the investigation on the manner in which reciprocal teaching enhanced the proficient and less proficient students’ reading comprehension, as well as to the investigation
on the increase in the students’ use of the meta-cognitive reading strategies in reading the English texts in the Reading Strategies Questionnaire.

The instruments for collecting qualitative data were formed of the Reading Think Aloud Sheet, and the interviews. Following is a detailed description of each of these instruments.

**Reading Think Aloud Sheet**

The participants in the experimental group recorded on the Reading Think Aloud Sheet the four main reading strategies they employed while completing their reading tasks in their cooperative group (see Appendix C). Before reading, they recorded what their prediction about the reading passage was. While reading, they recorded the four main strategies they employed. They wrote what references and vocabulary they clarified, what questions they asked about the content of the passage, and the main idea of each paragraph. After they finished reading, they summarized the whole passage.

**Interview**

Ten interview questions were asked to all participants in the experimental group. They were related to the four main reading strategies of reciprocal teaching the participants employed while completing the reading tasks, how they used each strategy, their opinion on each strategy, and their opinion on working in groups (see Appendix D).

**3.5 Data Analysis**

The data collected through the above instruments were analyzed both quantitatively and qualitatively. The data from the pretest and posttest were
analyzed quantitatively, whereas the data from the questionnaire, the Reading Think Aloud Sheet, and the interviews were analyzed qualitatively.

3.5.1 Quantitative Data Analysis

To answer research question 1, the data from the pretest and posttest scores collected from the English reading comprehension test were analyzed as follows:

1. To investigate whether the participants’ reading comprehension improved after instruction through reciprocal teaching, the pretest and posttest mean scores of the students in the experimental group were compared to observe any significant difference using the dependent t-test from the statistical software SPSS 18.0 for WINDOWS.

To answer research question 2, the data were analyzed as follows:

2. The proficient students’ pretest and posttest mean scores collected from the English reading comprehension test were calculated using the dependent t-test to determine the presence of any significant difference within the group.

The less proficient students’ pretest and posttest mean scores collected from the English reading comprehension test were compared using the paired t-test to determine the presence of any significant difference within the experimental group.

To answer research question 3, the data were analyzed as follows:

3. The posttest mean scores of the participants in the experimental group and the control group were calculated using the independent t-test to determine the presence of any significant difference.
To answer research question 4, the data from the pre- and post-administration of the RSQ was analyzed as follows:

4. The data obtained from the pre- and post-administration of the RSQ to the experimental group were analyzed by descriptive statistics using the software SPSS 18.0 for WINDOWS to determine the mean scores and standard deviation (SD) for every meta-cognitive reading strategy employed by these participants before and after instruction through reciprocal teaching, in order to highlight any difference between the mean scores of the students’ ratings from the pre- and post-administration of the RSQ.

The findings were to demonstrate the difference between the reading strategies the experimental group employed prior to and after receiving instruction through reciprocal teaching. According to Oxford (1990), the scale value and its interpretation of the frequency of use for each reading strategy offer five levels: a) a very high level is demonstrated by mean scores between 4.50 and 5.00, b) a high level is defined by mean scores ranging between 3.50 and 4.49, c) a medium level is obtained by mean scores between 2.50 and 3.49, d) a low level is defined by mean scores between 1.50 and 2.49, and e) a very low level is characterized by mean scores between 1.00 and 1.49.

3.5.2 Qualitative Data Analysis

The data obtained from the Reading Think Aloud Sheet and interviews were analyzed qualitatively. The results undoubtedly indicated whether reciprocal teaching enhanced both proficient and less proficient students’ reading ability.
**Reading Think Aloud Sheet**

The data from the Reading Think Aloud Sheet were analyzed to note the development of the proficient and less proficient students in using the four main reading strategies of reciprocal teaching. The written results were analyzed on the differences of the four main reading strategies the participants employed in the early stage of working in groups compared to the 4th day of working in groups.

**Interview**

All the participants in the experimental group were interviewed on the four main reading strategies of reciprocal teaching they employed and their opinion on group work while completing the reading tasks. The participants’ answers were transcribed and categorized in order to compare the differences of usage of the main reading strategies between the proficient and the less proficient students.

**3.5.3 Data and Variables**

The data of this study were formed of the scores obtained from the reading pretest and posttest, the meta-cognitive reading strategies, the retrospective interviews, and the written think-aloud notes. These data were of two kinds: numerical and descriptive. The independent variable of this study was reciprocal teaching, and the dependent variables were formed of the students’ reading ability and the meta-cognitive reading strategies. The following are the conceptual framework of this study and the summary of the elements of reciprocal teaching and of skill-based teaching as used in this study.