5.0 INTRODUCTION

In the preceding chapters, introduction part, review of related literature, methodology, analysis of data and interpretation of results were presented. In this chapter, the summary related to chapter I, chapter II, chapter III, chapter IV are described, the research findings pertaining to the study, conclusions were drawn along with the implications of study were discussed.

5.1 SUMMARY

Learning Difficulties among Science Students: Learning disabilities are associated with problems in listening, reasoning, memory, attention, selecting and focusing on relevant stimuli, and the perception and processing of visual and/or auditory information. These perceptual and cognitive processing difficulties are assumed to be the underlying reason why students with learning disabilities experience one or more of the following characteristics: reading problems, deficits in written language, underachievement in math, poor social skills, attention deficits and hyperactivity, and behavioral problems.

Science is one of the major content areas of the general education curriculum on which the educational reform movement has focused. In such nationwide reports as Science for All Americans, our nation's schools have been exhorted to make science literacy a reality for all students, including those with disabilities. In 1993, the National Committee on Science Education Standards
and Assessment noted that "the commitment to Science for All implies inclusion not only of those who traditionally have received encouragement and opportunity to pursue science, but of women and girls, all racial and ethnic groups, the physically and educationally challenged, and those with limited English proficiency".

Many students with disabilities benefit from learning science through an activities oriented approach that reduces the reliance on textbooks, lectures, knowledge of vocabulary, and pencil-and-paper tests. This kind of approach seeks to promote learning by providing students with experiences that allow them to discover and experiment with science. Through discovery and inquiry, teachers involve students in creating and expanding their knowledge and understanding about the content area being studied. An Activities-oriented Approach includes:
(a) A Structured Learning Cycle, (b) Special Concerns, (c) Relate Science to Students' Lives, (d) Take Students on Field Trips, (e) Organize Instruction Around "Big Ideas" and Interdisciplinary Themes, (f) Have Students Work in Cooperative Learning Groups, (g) Use Instructional Technology and Multimedia and (h) Support Instruction Through Specially Designed Programs and Curricula.

**Teacher Role in Student Learning:** Teaching should be Consistent with Nature of Scientific Inquiry. Science, mathematics, and technology are defined as much by what they do and how they do it as they are by the results they achieve. To understand them as ways of thinking and doing, as well as bodies of knowledge, requires that students have some experience with the kinds of thought and action that are typical of those fields. Therefore, the teachers should
employ the techniques like: (a) Start with Questions about Nature, (b) Engage Students Actively, (c) Concentrate on the Collection and Use of Evidence, (d) Provide Historical Perspectives, (e) Insist on Clear Expression, (f) Use a Team Approach, (g) Do Not Separate Knowing from Finding Out, (h) Deemphasize the Memorization of Technical Vocabulary.

**Science Teaching and Scientific Values**: Science is more than a body of knowledge and a way of accumulating and validating that knowledge. It is also a social activity that incorporates certain human values. Holding curiosity, creativity, imagination, and beauty in high esteem is certainly not confined to science, mathematics, and engineering—any more than skepticism and distaste for dogmatism are. However, they are all highly characteristic of the scientific endeavor. In learning science, students should encounter such values as part of their experience, not as empty claims. This suggests that teachers should strive to do the following: (a) science teachers should encourage students to raise questions, (b) teachers can express their own creativity by inventing activities, (c) Encourage a Spirit of Healthy Questioning, (d) avoid dogmatism, (e) Promote Aesthetic Responses.

Teachers should assure students that they understand the problem and will work with them to overcome it. Teachers can take such measures as: (a) Build on Success, (b) Provide Abundant Experience in Using Tools, (c) Support the Roles of Girls and Minorities in Science, (d) Emphasize Group Learning, (e) Science Teaching Should Extend Beyond the School.
The researcher could start the literature survey even as the information from the unstructured and structured interviews is being gathered. Reviewing the literature on the topic area at this time helps the researcher to focus further interviews more meaningfully on certain aspects found to be important is the published studies even if these had not surfaced during the earlier questioning. So, the literature survey is important for gathering the secondary data for the research which might be proved very helpful in the research. The literature survey can be conducted for several reasons. The literature review can be in any area of the business.

Literature survey is the documentation of a comprehensive review of the published and unpublished work from secondary sources data in the areas of specific interest to the researcher. The library is a rich storage base for secondary data and researchers used to spend several weeks and sometimes months going through books, journals, newspapers, magazines, conference proceedings, doctoral dissertations, master’s theses, government publications and financial reports to find information on their research topic.

This chapter deals with the design of the study, sample of the study, tools used data collection procedure followed and the statistical methods followed.

**Research Design:** After the selection of the problem and the review of related literature, the researcher has chosen the survey method to carry out the research work for collecting the data and to arrive at conclusions. For the selection of sample the researcher adopted stratified random sampling method.
Population: To collect the relevant data needed for the study, the researcher considered the teachers working in rural and urban secondary schools of Mahabubnagar and Ranga Reddy districts of Andhra Pradesh. Thus, all the secondary schools science teachers in Mahabubnagar and Ranga Reddy districts constitute the population.

Sample size: A total number of 120 teachers from the selected schools of government and private of Mahabubnagar and Ranga Reddy districts constitute the sample for the present study.

Sampling Technique Used: In order to select a representative sample for the study stratified random sampling technique was used. The basis for stratification was the gender (male, female) and management of the school (government and private).

Tools Used: The check list was used to measure the responses of the teachers. Further, MGTI was used to assess the intelligence of the students.

Administration of the tool: The tool was administered to the teachers in Mahabubnagar and Ranga Reddy districts. The researcher personally visited each school and collected data. The teachers of the schools were asked to fill up the check list with necessary details by putting a tick (\(\checkmark\)) mark on the response which was applicable to the students. Each teacher was given a check list and the researcher explained the importance of the study.

Collection of data: The duly filled in check lists were collected from the teachers. After calculating the responses and their percentages related to teachers' opinions, chi-square test was applied to know the significance of difference between the variables under consideration. Pearson Chi-square method was used to compare the significance of the difference between these
groups. t-test was conducted to know the significance of difference between the teachers in relation to gender, experience, qualifications (academic and professional), type of school and location of the school where they are working.

**Statistical techniques applied:** The raw data obtained from the check lists were coded using MS-Office Excel worksheet. For the statistical treatment of the above data SPSS (Statistical Package for Social Sciences) 17.0 was used. Means and Standard Deviations were calculated. Students’ t-test was applied to know the significant differences exist between teachers.

This chapter presented data analysis and interpretation, the results and discussion, pertaining to the hypothesis and the comprehensive discussion was given.

### 5.2 FINDINGS

1. It is found from the study that majority (65.8%) of the secondary school teachers responded that the students’ reverses words when reading and writing.

2. Most (70.0%) of the secondary school teachers expressed that the students’ having difficulty in following directions especially when multiple directions are given.

3. Some (52.5%) of the secondary school teachers told that the students’ forgets almost immediately what has been heard.

4. Some (51.7%) of the secondary school teachers did not agree with the statement that the students’ easily distracted by background noise or visual stimulation.
5. Majority (62.5%) of the secondary school teachers did not accepted that the students’ have poor comprehension and retention of material read.

6. Majority (60.0%) of the secondary school teachers did not accepted that the students’ writing is messy and incomplete with many cross outs and erasures.

7. Majority (67.5%) of the secondary school teachers opined that the students’ put laborious efforts and time to complete written work.

8. Some (50.8%) of the secondary school teachers coined that the students’ gives impulsive response without considering consequences.

9. Some (50.8%) of the secondary school teachers accepted that the students’ have a short attention span difficulty in concentration.

10. Some (58.3%) of the secondary school teachers told that the students’ have difficulty in hearing differences between similar sounding words.

11. Some (53.3%) of the secondary school teachers said that the students’ need extra reassurance when attempting tasks.

12. Majority (60.8%) of the secondary school teachers did not accepted that the students’ perform inconsistently from day to day or hour to hour.

13. Some (55.8%) of the secondary school teachers did not accepted that the students’ have difficulty completing tasks on time.

14. Majority (65.0%) of the secondary school teachers admitted that the students’ have a significant discrepancy between ability and achievement.
15. Majority (62.5%) of the secondary school teachers did not accepted that the students' have poor self-confidence and self-image.

16. Most (73.3%) of the secondary school teachers considered that the students' often left behind or incomplete assignments and notes.

17. Most (80.0%) of the secondary school teachers accepted that the students’ have difficulty with reading body language and facial expression of the teacher.

18. Majority (61.7%) of the secondary school teachers expressed that the students’ have difficulty in planning.

19. Most (70.8%) of the secondary school teachers opined that the students’ demonstrate poor decision making skills.

20. Majority (61.7%) of the secondary school teachers said that the students’ have difficulty with social skills.

21. Most (80.0%) of the secondary school teachers accepted that the students confuses between Phyla / Phylum, Micro / Macro, and Mitosis / Miasis.

22. Most (82.5%) of the secondary school teachers made it clear that the students has difficulty with abstractions, needs concrete demonstration.

23. Majority (66.7%) of the secondary school teachers agreed that the students have trouble in learning shapes of chemical Bonds.

24. Most (77.5%) of the secondary school teachers have the opinion that the students difficulty in organizing scientific ideas and information.

25. Most (80.0%) of the secondary school teachers expressed that the students inability to memorize the Periodical tables.
26. Most (72.5%) of the secondary school teachers have the same opinion that the students often difficulty in remembering the sequence of electronic configuration of elements.

27. Some (53.3%) of the secondary school teachers did not accept that the students have difficulty in understanding problems of electrolysis.

28. Some (57.5%) of the secondary school teachers accepted that the students able to explain Chemical Equations orally but not in writing.

29. Half (50%) of the secondary school teachers mentioned that the students have difficulty with hand-eye coordination while drawing science figures.

30. Some (53.3%) of the secondary school teachers opined that the students have difficulty in drawing conclusions and making inferences.

31. Some (55.5%) of the secondary school teachers made it clear that the students have difficulty in understanding concepts such as gravitation, glycolysis, pollination, etc.

32. Majority (67.5%) of the secondary school teachers did not accept that the students have less tolerance for frustration and failure in science lab work.

33. Some (58.3%) of the secondary school teachers said that the students make consistent reading errors in scientific names of animal kingdom.

34. Majority (65.0%) of the secondary school teachers said that the students have difficulty in remembering and learning atomic numbers and Symbols.
35. Majority (60.0%) of the secondary school teachers said that the students have difficulty with science concepts and basic operations with reasoning.

36. Most (82.2%) of the secondary school teachers said that the students do not automatically relate new facts to known facts.

37. Majority (65.8%) of the secondary school teachers did not accept that the students have difficulty in remembering shapes of Bacteria and Virus.

38. Some (53.3%) of the secondary school teachers said that the students substitutes words while reading the science book.

39. Most (79.2%) of the secondary school teachers did not accept that the students can’t make simple line drawing of pictures.

40. Majority (69.2%) of the secondary school teachers did not accepted that the students can’t have difficulty or confusion of chemical symbols (i.e. Na/S, Co/Cu and Sn/Si).

41. There is no significant difference at 0.05 level between male and female school teachers responses with regard to learning difficulties in science among the secondary school students.

42. There is no significant difference at 0.05 level between government and private school teachers responses with regard to learning difficulties in science among the secondary school students.

43. There is no significant difference at 0.05 level between rural and urban school teachers responses with regard to learning difficulties in science among the secondary school students.
44. There is a significant difference at 0.05 level between the teachers with UG and PG (academic qualification) responses with regard to learning difficulties in science among the secondary school students.

45. There is no significant difference at 0.05 level between B.Ed. and M.Ed. (professional qualification) teachers with regard to learning difficulties in science among the secondary school students.

46. There is no significant difference at 0.05 level between below 10 years experience and 10 years above experience school teachers with regard to learning difficulties in science among the secondary school students.

47. The following are top 10 learning difficulties among the secondary school students.
   i. Does not automatically relate new facts to known facts.
   ii. Has difficulty with abstractions, needs concrete demonstration.
   iii. Confuses between Phyla / Phylum, Micro/Macro and Mitosis / Miasis.
   iv. Inability to memorize the periodical table.
   v. Difficulty in organizing scientific ideas and information.
   vi. Demonstrates poor decision making skills.
   vii. Difficulty with reading body language and facial expression.
   viii. Have difficulty in following directions especially when multiple directions are given.
   ix. Difficulty or confusion of chemical symbols (i.e., Na/S, Co/Cu and Sn/Si).
   x. Laborious effort and time to complete written work.
5.3 CONCLUSIONS

The following are the conclusion of the study based on the findings:

1. The students reverse the words when reading and writing.
2. The students are having difficulty in following directions especially when multiple directions are given.
3. The students forget almost immediately what has been heard.
4. The students are not easily distracted by background noise or visual stimulation.
5. The students do not have poor comprehension and retention of material read.
6. The students’ writing is not messy and incomplete with many cross outs and erasures.
7. The students put laborious efforts and time to complete written work.
8. The students give impulsive response without considering consequences.
9. The students have a short attention span difficulty in concentration.
10. The students have difficulty in hearing differences between similar sounding words.
11. The students need extra reassurance when attempting tasks.
12. The students didn’t perform inconsistently from day to day or hour to hour.
13. The students didn’t have difficulty completing tasks on time.
14. The students have a significant discrepancy between ability and achievement.
15. The students didn’t have poor self-confidence and self-image.
16. The students often left behind or incomplete assignments and notes.
17. The students have difficulty with reading body language and facial expression of the teacher.
18. The students have difficulty in planning.
19. The students demonstrate poor decision making skills.
20. The students have difficulty with social skills.
21. The students confuses between Phyla / Phylum, Micro / Macro, and Mitosis / Miasis.
22. The students has difficulty with abstractions, needs concrete demonstration.
23. The students have trouble in learning shapes of chemical Bonds.
24. The students have difficulty in organizing scientific ideas and information.
25. The students show their inability to memorize the Periodical tables.
26. The students often difficulty in remembering the sequence of electronic configuration of elements.
27. The students didn’t have difficulty in understanding problems of electrolysis.
28. The students able to explain Chemical Equations orally but not in writing.
29. The students have difficulty with hand-eye coordination while drawing science figures.
30. The students have difficulty in drawing conclusions and making inferences.
31. The students have difficulty in understanding concepts such as gravitation, glycolisis, pollination, etc.
32. The students have tolerance for frustration and failure in science lab work.
33. The students make consistent reading errors in scientific names of animal kingdom.
34. The students have difficulty in remembering and learning atomic numbers and Symbols.
35. The students have difficulty with science concepts and basic operations with reasoning.
36. The students do not automatically relate new facts to known facts.
37. The students have no difficulty in remembering shapes of Bacteria and Virus.
38. The students substitutes words while reading the science book.
39. The students can make simple line drawing of pictures.
40. The students have difficulty or confusion of chemical symbols (i.e. Na/S, Co/Cu and Sn/Si).
41. There is no significant difference at 0.05 level between male and female school teachers responses with regard to learning difficulties in science among the secondary school students.
42. There is no significant difference at 0.05 level between government and private school teachers responses with regard to learning difficulties in science among the secondary school students.
43. That there is no significant difference at 0.05 level between rural and urban school teachers responses with regard to learning difficulties in science among the secondary school students.

44. There is a significant difference at 0.05 level between the teachers with UG and PG (academic qualification) responses with regard to learning difficulties in science among the secondary school students.

45. There is no significant difference at 0.05 level between B.Ed. and M.Ed. (professional qualification) teachers with regard to learning difficulties in science among the secondary school students.

46. There is no significant difference at 0.05 level between below 10 years experience and 10 years above experience school teachers with regard to learning difficulties in science among the secondary school students.

47. The following are top 10 learning difficulties among the secondary school students.

i. The students do not automatically relate new facts to known facts.

ii. The students has difficulty with abstractions, needs concrete demonstration.

iii. The students confuses between Phyla / Phylum, Micro / Macro, and Mitosis / Miasis.

iv. The students have inability to memorize the Periodical tables.

v. The students have difficulty in organizing scientific ideas and information.

vi. The students demonstrate poor decision making skills.
vii. The students face the difficulty with reading body language and facial expression.

viii. The students are having difficulty in following directions especially when multiple directions are given.

ix. The students have difficulty or confusion of chemical symbols (i.e., Na/S, Co/Cu and Sn/Si).

x. The students put laborious efforts and time to complete written work.

5.4 RESULTS ON HYPOTHESES TESTING

Hypothesis I: “There is no significant difference between male and female teachers with regard to their response about learning difficulties in science among the secondary school students”.

Result: It is concluded that there is no significant difference at 0.05 level in the response male and female school teachers. Hence, Hypothesis-I is accepted. In this regard, it can be understood from the previous study that there was statistically significant gender differences were found in most aspects of the school environment, with female science teachers perceiving greater collegiality among teachers, higher gender equity among students, and stronger professional interest, and with male science teachers perceiving lower work pressure and better teacher–student relations (Shwu-yong L. Huang and Barry J. Frase, 2009). Gender differences in science teachers' perceptions of collegiality, work pressure, and gender equity in the school environment persisted even after controlling for teachers' background and school characteristics. Hence, the present study on
learning difficulties in science among secondary school students also found there is a gender difference in secondary school teachers of Mahabubnagar and Ranga Reddy district. Further, it can be concluded that there is no significant difference between male and female teachers with reference to their responses about learning difficulties in science among secondary school students.

**Hypothesis II**: “There is no significant difference between government and private teachers with regard to their response about learning difficulties in science among the secondary school students”.

**Result**: It is concluded that there is no significant difference at 0.05 level in the response government and private school teachers. Hence, Hypothesis-II is accepted and it can be concluded that there is no significant difference between government and private school teachers in their responses about learning difficulties in science among secondary school students.

**Hypothesis III**: There is no significant difference between rural and urban teachers with regard to their response about learning difficulties in science among the secondary school students.

**Result**: It is concluded that there is no significant difference in the response of rural and urban school teachers. Hence, Hypothesis-III is accepted.

This research study is compared with the study of Ahmad M. J. O. AL Fawair, Jamal M. S. AL Khateeb and Yazan Abdel Aziz Semreen AL-Wreikat
(2012). He examined the relationship between a training program designed for students with learning disabilities and their perceived competence. The need for such endeavor must be accorded due attention in order to create a comprehensive policy reform that takes into account the different dimensions of effectual reform. The study declares the need for providing a clear insight into the obstacles faced by Jordanian students, especially those in the rural areas, who are continually hampered by learning disabilities. In an attempt to answer the research questions, the “Perceived Competence Scale for Children” (Harter, 1982) was used as the main tool in the current study. Moreover, the study sample consisted of 26 fourth-grade students with learning disabilities who joined the resource rooms of the Ministry of Education in the Jerash district of Jordan. Findings of the study indicated the presence of significant statistical differences between the experimental group that underwent the training program and the control group that was not exposed to it. Further, it can be concluded that there is no significant difference between rural and urban school teachers with reference to their responses about learning difficulties in science among secondary school students.

**Hypothesis IV**: There is no significant difference between UG and PG qualified teachers (academic qualification) with regard to their response about learning difficulties in science among the secondary school students.

**Result**: it is concluded that there is a significant difference at 0.05 level in the response of UG and PG qualified school teachers. Hence, Hypothesis-IV is rejected, and it can be concluded that there is a significant difference between
UG and PG qualified (academic) school teachers with reference to their responses about learning difficulties in science among secondary school students. Further, the mean value of UG qualified school teachers is more than that of the PG qualified school teachers. Hence, it can be concluded that majority of the UG qualified school teachers’ responded ‘yes’ with reference to learning difficulties in science among the secondary school students when compared to PG qualified teachers.

**Hypothesis V**: There is no significant difference between B.Ed. and M.Ed. qualified teachers (Professional qualification) with regard to their response about learning difficulties in science among the secondary school students.

**Result**: It is concluded that there is no significant difference at 0.05 level in the response of B.Ed. and M.Ed. qualified school teachers. Hence, Hypothesis-V is accepted, and it can be concluded that there is no significant difference between B.Ed. and M.Ed. qualified (professional) school teachers with reference to their responses about learning difficulties in science among secondary school students.

**Hypothesis VI**: There is no significant difference between below 10 years experience and 10 years above experience teachers with regard to their response about learning difficulties in science among the secondary school students.
**Result:** It is concluded that there is no significant difference in the response of below 10 years experience and 10 years above experience school teachers. Hence, Hypothesis-VI is accepted, and it can be concluded that there is no significant difference between the teachers with below 10 years experience and 10 years above experience teacher with reference to their responses about learning difficulties in science among secondary school students.

5.5 **IMPLICATIONS OF THE STUDY**

The following implications are derived from the present study to overcome the learning difficulties in science among the secondary school students of Mahabubnagar and Ranga Reddy districts.

1. The students should practice periodically to overcome the reverses words when reading and writing.

2. As most of the students are having difficulty in following directions especially when multiple directions are given. Hence, It is advised to the teachers the required directions should be individual and appropriate to avoid ambiguity in following directions especially when reading and writing.

3. The students forget almost immediately what has been heard. To prevent this problem the students should be trained through ‘learning while doing’ method.

4. The students easily distracted by background noise or visual stimulation. In this context, the management has to make necessary arrangement in the classrooms to avoid the situation.
5. The students have poor comprehension and retention of material read. Interventions need to begin as early as possible, using multiple strategies and activities in order to increase reading comprehension skills.

6. The students writing are messy and incomplete with many cross outs and erasures. To overcome this situation the students should be given writing practice regularly with appropriate level of work.

7. The students put laborious efforts and time to complete written work. To overcome this, teachers should focus to teach them shortcut methods to solve the problems.

8. The students should be taught to avoid the impulsive responses without considering consequences.

9. The learning sessions should be planned in view of short attention span difficulty in concentration.

10. The teachers should take special attention while introducing similar sounding words to avoid difficulty in hearing differences between similar sounding words and the doubts should be clarified by the teachers immediately.

11. The students need extra reassurance when attempting tasks.

12. The students should know the significant discrepancy between ability and achievement.

13. The students must improve their self-confidence and self-image. In this direction the school management has to conduct psychological counseling classes by eminent personalities in psychology to boost the students’ self-confidence and self-image.
14. Parents has to take responsibility with regard to their wards on ‘often left behind or incomplete assignments and notes’.

15. The teacher should express appropriate subject ideas while teaching the science subject in the classroom to overcome the difficulty with reading body language and facial expressions.

16. The students should make their proper planning to avoid the difficulties.

17. The students should improve their confidence levels to avoid poor decision making skills.

18. To improve their social skills the students participate in different types of activities like NCC, NSS, cultural activities, etc.

19. To avoid the confusion between Phyla / Phylum, Micro / Macro, and Mitosis / Miasis, the students practice LSRW skills.

20. The students needs concrete demonstration to avoid the difficulty with abstractions.

21. The students should practice and memorize the structure in learning shapes of chemical bonds.

22. The students should practice reading habits books, science periodicals and attend the science exhibitions in organizing scientific ideas and information.

23. It is appropriate here to mention that ‘practice makes man perfect’ in this regard (i) to memorize the periodical tables, (ii) in remembering the sequence of electronic configuration of elements, (iii) in understanding problems of electrolysis, (iv) to explain Chemical
Equations orally but not in writing and (v) with hand-eye coordination while drawing science figures.

24. The students should practice precise writing in drawing conclusions and making inferences.

25. The students should learn meaning and the teacher should explain the method of teaching like simple to complex to understand concepts such as gravitation, glycolisis, pollination, etc.

26. To avoid tolerance for frustration and failure in science lab work the students has necessary leisure work and participate in physical exercises, yoga and meditation.

27. The students make consistent reading in scientific names of animal kingdom to avoid errors.

28. More practice is necessary (i) in remembering and learning atomic numbers and symbols, (ii) to overcome the difficulty with science concepts and basic operations with reasoning.

29. The students should know the similarity between new facts and known facts and to correlate them.

5.6 SUGGESTIONS FOR FURTHER RESEARCH

1. A similar study may be taken to identify learning difficulties in science subjects, separately, like Physics, Chemistry, Botany, Zoology, etc.

2. A similar study needs to be taken up at large scale covering sample at state and national level.

3. A diagnostic study may be taken up to identify the reasons for learning difficulties in science.
4. A study may be taken to develop intervention strategies to help the children with learning difficulties in science.

5. A multi-disciplinary study may be taken up to assess the effectiveness of various intervention strategies used to help children with learning difficulties at secondary school level.