CHAPTER 5
SUMMARY AND CONCLUSION

5.1 INTRODUCTION

In this present technological era, the basic goal of education should assist the pupils’ knowledge and skills that is necessary to think critically and solve complex problems. Assessment of such knowledge and skills helps in knowing the pupils’ development and progress. Education paves way for the pupils reasoning abilities and intellectual capacities so as to produce successful individuals in the future society.

Reasoning is important both in pupils’ academic life and in their adult lives. Developing their reasoning skills will allow them to become socially independent and succeed in their professional life later on. Having reasoning abilities will allow the pupils to develop qualities such as perception, understanding and solving complicated subject questions, empathy and logical reasoning as well as ensuring they have a great vocabulary and numerical ability. Logical thinking abilities gives pupils, the ability to understand what they have read or been shown, and also to build upon that knowledge without incremental guidance. Logical thinking teaches pupils that knowledge which is fluid and builds upon itself.

The investigator anticipated that the reasoning ability would channelize the pupils, to perform, compete and develop their achievements academically and also in other competitive examinations. Moreover, this type of test would analyse their Cognitive Ability level and hence the present investigation entitled as “A Study on the Relationship between Cognitive Ability and Academic Achievement of Eighth Standard Pupils” was undertaken with the following objectives:

5.2 OBJECTIVES OF THE STUDY

The major objectives of the study were to:

1. Construct and validate Cognitive Ability Test Battery.
2. Adapt, validate and implement the Cognitive Ability Test Battery for the selected sample.
3. Collect the scores for three dimensions of Cognitive Ability and Academic Achievement for the selected sample
4. Compare the three dimensions of Cognitive Ability Scores in relation to Gender, Locality and Medium of Instruction.
5. Examine the relationship between Cognitive Ability and Academic Achievement scores of Eighth standard pupils
6. Analyse the relationship of three dimensions of Cognitive Ability Scores with Academic Achievement Scores of the Pupils.
7. Compare the three dimensions of Cognitive Ability Scores in relation to Type of School, Parents’ Educational Qualification and Occupation with Academic Achievement Scores of the Pupils.
8. Determine the relationship between Academic Achievement Scores in relation to personal and academic variables.
9. Predict the relationship between the pupils Cognitive Ability Scores and Academic Achievement Score of the Pupils in relation to personal and academic Variables.

5.3 METHODOLOGY

The investigator selected a sample of six hundred students of standard VIII from three types of schools namely, Government, Government aided and Self-financing schools in Coimbatore by Convenient sampling method. Due representation to Gender, Locality, Type of school, Medium of Instruction, Parental Educational Qualification and Parental Occupation were considered while selecting the sample.

The Cognitive Ability Test Battery (Lohman and Hagen. 2003) was adapted and modified by the investigator according to the Indian cultural and educational context. The same dimensions were selected by the investigator, and the items were modified and prepared to suit the conditions of the sample of the present study. This Cognitive Ability test battery was developed according to the prevailing mental abilities of students that are prevailing in the city.

The Cognitive Abilities Test is designed to measure a student’s reasoning ability to operate with abstract and symbolic relationships. It is a norm-referenced test. It is a type of Group Administered Ability test battery. The purpose of this type of test is to assess students’ abilities in reasoning and problem solving using verbal, quantitative, and nonverbal (spatial) symbols. The Cognitive Abilities Test measures students’ learned reasoning abilities in the three areas most linked to academic success in school: Verbal, Quantitative and Nonverbal. Its primary goal is to assess students’ reasoning abilities.

The investigator used Achievement test (Average Marks of the tri-semesters of Language and Mathematics) were obtained from the respective teachers from their schools as
tool of evaluation. From the scores obtained by the pupils, the relationships of Cognitive Ability in relation to the variables were evaluated and the findings were enumerated.

5.4 FINDINGS OF THE STUDY

1. The descriptive analysis analysed that 52% of the pupils are below average, 42.5% of the pupils are average and 5.3% of the pupils possess very low Verbal Ability. Only 0.2% of the pupils are above average in Verbal Reasoning Ability.

2. It is found that 1.3% of the pupils possess very high Quantitative Ability, 6.3% possess above average, 44.5% of the pupils are average, 39% of the pupils are below average and 8.8% of the pupils possess very low Ability in Quantitative Reasoning Ability.

3. It was revealed that 2.3% of the pupils are above average, 73.5% of the pupils possess average level, 23.2% of the pupils are below average and 1.0% of the pupils possess very low Non-Verbal Reasoning Ability.

4. It was evident from the t-test that the difference in Gender, Locality, and Medium of instruction had significant influence on Verbal Reasoning Ability, Quantitative Reasoning Ability and Non-Verbal Reasoning Ability.

5. The correlation coefficient revealed that there was significant correlation between three dimensions namely Verbal Ability, Quantitative Ability and Non-Verbal Ability in relation to Academic Achievement of the pupils.

6. The correlation analysis revealed that Verbal Ability is positively correlated to the Academic Achievement (language of both Tamil and English medium) of the Eighth standard pupils.

7. The correlation analysis also indicated that Quantitative Ability was correlated to the Academic Achievement (Mathematics) of the pupils.

8. The correlation analysis indicated that verbal ability is correlated to the non-verbal ability of the students.

9. It was inferred that, there is a highly significant correlation between sub-components of Verbal Ability in relation to Sub-components of Quantitative Ability and Non-Verbal Ability of the students.

10. It was inferred that the cognitive ability SAS scores differed significantly between boys and girls. It was noted that the quantitative ability is significantly higher than the verbal ability and non-verbal ability among the boys and girls.

11. It was found that significant difference was noted between Tamil medium and English medium students. The study revealed that pupils’ studying in English medium have
significantly higher Verbal Ability, Numerical Ability and Reasoning Ability than those studying in mother tongue medium, i.e. in Tamil medium.

12. It was found that there was significant difference in Verbal, Quantitative and Non- Verbal SAS scores between rural and urban pupils. It was seen that the Non-Verbal Ability was higher in the urban area over the rural area followed by quantitative ability and verbal ability.

13. Significant difference was noted between the average Verbal SAS scores, Quantitative and Non-Verbal SAS Scores among the rural pupils based on Gender. The rural boys performed better in Quantitative Ability part followed by Verbal and Non-Verbal Ability parts while the rural girls do better in Non-Verbal Ability part followed by Quantitative and Verbal Ability parts.

14. The findings of this study revealed that the urban boys are better in Quantitative Ability followed by Verbal and Non-Verbal Ability while the urban girls performed well in Non-Verbal Ability followed by Verbal and Quantitative Ability parts.

15. Significant difference was noted between the Verbal and Non- Verbal SAS scores of rural girls and urban girls, whereas, no significant difference was noted for the Quantitative SAS scores for the same sub-samples.

16. It was noted that Verbal, Quantitative and Non- Verbal SAS scores differ significantly between rural and urban boys. The urban boys performed well in Verbal Ability, Quantitative and Non-Verbal Abilities than the rural boys.

17. It was inferred that the Non-Verbal SAS scores differed significantly between Rural English Medium and Urban English Medium students whereas the Verbal and Quantitative SAS scores did not differ significantly. The pupils studying in English Medium in rural area do well in Quantitative Ability than the pupils of English Medium in urban area while the pupils of urban English Medium do well in Non-Verbal and Verbal Abilities than the rural English medium pupils.

18. Significant difference was noted between Rural Tamil Medium and Rural English Medium in Verbal and Quantitative Abilities whereas no significant difference in Non-Verbal SAS scores. The Rural English medium pupils do well than the Rural Tamil medium pupils in Verbal and Quantitative Ability whereas Rural English Rural Tamil medium pupils are of same level in Non-Verbal Ability.

19. It was found that the Verbal SAS scores, Quantitative SAS scores and Non- Verbal SAS scores differed significantly between Tamil Medium and English Medium students of
Government Schools. In the Government Schools, pupils studying English Medium do well than the pupils studying Tamil medium in the Cognitive Ability Test.

20. Significant difference was found in Verbal SAS scores and Quantitative SAS scores between Tamil medium and English medium pupils of Government-aided Schools whereas no significant difference was found in Non-Verbal Ability SAS scores. It was seen from the findings of this study that the pupils in Government- Aided schools, studying in English medium performed well in Quantitative Ability and Verbal Ability than the Tamil medium pupils while the pupils studying in English medium as well as Tamil medium performed in the same level in the Non-Verbal Ability.

21. Significant difference was noted for Verbal Ability in Government and Government- Aided Schools pupils studying in Tamil Medium whereas no significant difference was noted for Quantitative and Non-Verbal Ability. It was noted that pupils of Government and Government- Aided Schools studying in Tamil Medium possessed equal level Quantitative and Non-Verbal Ability whereas the Government School pupils possessed a higher Verbal Ability than the Government- Aided Schools pupils.

22. It was found that the average Verbal SAS Scores and Quantitative SAS Scores did not differ significantly while the Non-Verbal SAS Scores differed significantly between the English medium pupils of Government and Government –Aided schools. The English medium pupils of Government and Government –Aided schools possessed an equal level of Verbal and Quantitative Ability whereas the Government schools pupils possessed a little higher Non-Verbal ability.

23. The F values for Verbal, Quantitative and Non-Verbal SAS Scores showed that there was significant difference among the total sample. The findings of the study revealed that the students of Self-Financing schools performed better in Verbal, Quantitative and Non-Verbal ability tests followed by Government and Government-Aided schools pupils.

24. ANOVA results indicated that there is a significant difference in the Cognitive Ability SAS Scores of boys studying in different types of Schools. The Boys studying in Self-financing schools possess higher Cognitive Ability than the boys of Government- Aided and Government Schools.

25. ANOVA results showed that there is significant difference in Verbal and Non-Verbal SAS Scores in relation to girls studying in different Schools whereas there is no significant difference in Quantitative SAS Scores.

26. The results from the Analysis of Variance (ANOVA) indicated that the Verbal and Quantitative Ability of the sample in relation to the Fathers’ Educational qualification do
not differ significantly while Non-Verbal Ability differs significantly. It is inferred that the Fathers’ qualification had influence on the Non-Verbal Ability than the Quantitative and Verbal Abilities of the sample. The findings of this study also revealed that the Fathers who had qualified till graduation has more influence in the Cognitive Ability Tests of the pupils.

27. The results from the Analysis of Variance (ANOVA) indicated that Mothers’ qualification did not make any significant difference on the Verbal Ability of the pupils while there was significant difference in Quantitative Ability and Non-Verbal Ability of the sample. The findings of this study revealed that the Mothers who had qualified till graduation had more influence in the Cognitive Ability Tests of the pupils.

28. ANOVA results inferred that the Verbal SAS Scores, Quantitative SAS Scores and Non-Verbal SAS scores did not differ significantly in relation to Fathers’ occupation.

29. The results from the Analysis of Variance (ANOVA) showed that the Mothers’ occupation had significant difference in influencing the Verbal Ability and Quantitative Ability of the pupils, whereas no significant difference was seen influencing the Non-Verbal Ability of the pupils.

30. The chi-square value revealed that there was significant association between gender and achievement level of the pupils.

31. The chi square values obtained for rural and urban pupils indicated that there is significant association between locality and achievement level of pupils.

32. It was also evident that the chi square value showed that there is significant association between medium of instruction and achievement level of the pupils. It was also found that the chi square value showed that there is significant association between the type of school and academic achievement level namely Under Achievers, Average Achievers, Above Average Achievers and High Achievers.

33. It was evident from the chi square value obtained for fathers’ qualification and mothers’ qualification there was no significant association between parents’ educational qualification and the achievement level of the pupils. Hence it was clear from the findings that the parents’ qualification makes no influence upon the achievement level of the pupils.

34. It was found, that there is no significant association between Parents’ occupation and the achievement level of the pupils as seen from obtained chi square value. Hence it is clear from the findings that the parents Occupation level makes no influence upon the achievement level of the pupils.
35. The Post –Hoc (LSD) Analysis determined that the Verbal Ability showed significant difference of the pupils studying in Government, Government-Aided and Self-Financing schools. There was no significant difference between pupils of the Government and Government-Aided Schools in the Quantitative Ability and Non-Verbal Ability.

36. The Post-Hoc (LSD) analysis made it clear that the boys studying in all the three types of schools differ significantly in the Verbal Ability, Quantitative Ability and Non-Verbal Ability tests. The findings revealed that the boys studying in Self-Financing schools have higher Verbal Ability than the pupils of Government and Government -Aided schools.

37. It was predicted from the Multiple Regression Analysis that the Medium of Instruction had the highest and significant standardized beta co-efficient, which indicated that it was the most important factor contributing to Cognitive Ability and Academic Achievement. Gender and Type of Institution had negative regression co-efficient respectively. Parent’s Qualification and occupation did not contribute to cognitive ability and achievement of the pupils.

38. It was found that the dependent variable achievement scores is the predictor for the other chosen variables namely, Verbal Ability, Quantitative Ability and Non-verbal Ability. It is understood that among the three predictors, Verbal Ability had the highest and significant standardized beta co-efficient, which reveals that it is the most important factor contributing to Academic Achievement. Among the independent variable Non-verbal ability did not contribute to dependent variable academic achievement.

39. The Regression value indicates that high correlation (0.791) exists between the dependent variable (Achievement marks) and the set of independent variables (personal variables, Verbal, Quantitative and Non-verbal Scores). The variables Fathers’ qualification, Verbal Score and Quantitative score have positive influence on Achievement marks. That is when Verbal scores are higher or the educational qualification of the fathers are higher the achievement marks will also be higher for the pupils. On the other hand, Mothers’ Qualification and Non-verbal Score show negative effect on Achievement marks of the pupils.

40. Regression coefficient of Gender, a dichotomous variable shows that girls get less achievement marks compared to boys, whereas Medium of instruction, another dichotomous variable shows students of English medium get significantly higher achievement marks compared to the pupils studying in Tamil medium.
41. The R value indicates high correlation (0.746) which exists between the dependent variable (Achievement marks) and the set of independent variables (personal variables, Verbal, Quantitative and Non-verbal Scores).

42. The Tests of Equality of Group Means inferred that the personal variables Gender, Type of school, Medium of instruction and locality had significant impact on Cognitive Abilities in relation to Academic Achievement.

43. The standardized coefficients indicated that Cognitive Ability in relation to Academic Achievement is influenced more by the academic variable, medium of instruction.

44. Medium of instruction is discriminating high in the moderate category of cognitive ability.

45. Correlation between the canonical discriminant functions and the discriminate variable showed significant difference. There existed largest absolute correlation between each variable and any discriminant function. 66.4 percentage of the variation in the discriminate function is due to medium of instruction which contributes in discriminating between low, moderate and high Cognitive Ability. Similarly gender which contributes about 49.8 percentage in discriminating function low, medium and high cognitive ability.

46. Prior Probabilities reveal that the 67.2% of original grouped cases are exactly classified. It is seen that the discriminate function has predicted 17.3 % of the pupils are exactly in the low Cognitive Ability in relation to Academic Achievement, 60.9 % of moderate Cognitive Ability in relation to Academic Achievement and 2.2 % are in the high Cognitive Ability in relation to Academic Achievement.

**INTERPRETATIONS TO THE FINDINGS**

The correlation co-efficient reveals that the Verbal Ability, Quantitative Ability and Non-Verbal Ability is correlated to Academic Achievement (for both Tamil and English Medium) of the Eighth Standard Students.

The ‘t’ test result reveals that the quantitative ability is higher among the boys and girls than the verbal ability and non-verbal ability. This may be due to the fact the boys and girls are interested and good in numbers. The test also reveals that English medium pupils have higher Verbal Ability, Numerical Ability and Reasoning Ability than those studying in mother tongue medium, i.e. in Tamil medium. This may be due to the fact that English medium pupils have more access to other books. They may have good library facility wherein these pupils have the opportunity to go through those books.
The ‘t’ test result reveals that the Non-Verbal Ability is higher in the urban area over the rural area followed by Quantitative Ability and Verbal Ability. This may be due to the fact that the urban pupils are able to think logically and try to apply it at the right time as their horizons are wide spread whereas the concentration ability is comparatively lesser among the rural area pupils.

The ANOVA result shows that the pupils’ of Self-Financing schools performed better in Verbal, Quantitative and Non-Verbal ability tests followed by Government and Government-Aided schools pupils. This may be due to the fact that the Self-Financing schools have better facilities in both curricular and co-curricular activities which are helpful for improving their abilities. It is in general widely accepted that Self-Financing schools do better not only academically but also on other aspects.

The chi-square test result reveals that the Gender, locality, medium of instruction, type of school are influencing achievement level of the pupils, whereas parents’ educational qualification and occupation makes no influence upon the Achievement level of the pupils. The post-hoc(LSD) analysis reveals that the Verbal Ability is higher among the pupils studying in Government followed by Government-Aided and Self-Financing schools, whereas Quantitative Ability and Non-Verbal Ability are of the same level.

The Multiple Regression Analysis predicts that the Medium of Instruction is the most important factor contributing to Cognitive Ability and Academic Achievement. Verbal Ability had the highest and significant standardized beta coefficient, which reveals that it is the most important factor contributing to Academic Achievement.

5.5 EDUCATIONAL IMPLICATIONS

- The results of the study have proved that Cognitive Abilities Test assist the pupils as well as the teachers to understand their levels and challenges that lay ahead.
- The Cognitive Ability test is found to be very effective in learning the concepts easily and meaningfully. The study revealed that Cognitive Ability test is effective in improving academic achievement and learning methodology of learners.
- The Cognitive Ability test motivates students to actively participate in the learning activity. The pupils are also motivated to read books and journals, to analyse critically and to think logically.
- The investigator recommends that the educators and education planners at all levels to understand students diverse cognitive abilities and challenges.
• The investigator recommends that Teachers should be competent enough so as address to all types of learning challenges while encouraging the growth of high ability learners.

• The study reveals that the pupil should be constantly encouraged to practice their reasoning skills in many settings, from their other classes to their practicum sites, to gain practice and confidence in applying their thinking skills.

• The pupils should be given frequent feedback, and provide both cognitive and emotional support for their efforts.

• The pupils should be given explicitly assistance to address issues of uncertainty in judgment-making and to examine their assumptions about knowledge and how it is gained.

• The study revealed that Cognitive Ability testing is effective in improving learning and performance outcomes. The teachers in service should be trained to the need for incorporating new methods and technologies, in order to master its necessity in their teaching.

• Awareness and orientation programmes should be conducted on Cognitive Ability testing and its importance.

• The teachers should be given opportunities to attend seminars, workshops, refresher courses etc. so as to equip themselves with the knowledge to develop the reasoning abilities of the pupils.

• To understand the knowledge and importance of Cognitive Ability testing in school and encourage all teachers to be aware of the importance of Cognitive Ability testing.

• The investigator recommends that the School authorities should constantly arrange activities like debates, Discussions, Inter school competitions and exchange programmes so that the students actively engage themselves to develop their reasoning abilities.

• Sufficient financial aid should be allotted to train the pupils to develop their Cognitive Abilities so that they could take up competitive exams without any hesitations.

5.6 RECOMMENDATIONS

Cognitive abilities contribute to the gathering and organising of knowledge, to the repeated accumulation and reconstruction of progressive knowledge, to the acquiring and retrieval of knowledge, and to its use in problem representation and solution. Cognitive abilities play a central role in both the acquisition and organization functions of educational
achievement; their influence can hardly be suppressed or ignored in educational achievement testing that assesses knowledge structures.

- The results of the study have showed that the boys have better Verbal and Quantitative Ability than the Girls, whereas the Girls are better than the boys in Non-Verbal ability. The Urban pupils possess better Cognitive Ability than their rural counterparts. In all the three dimensions of Cognitive Ability the English Medium pupils were found to do better than the Tamil Medium pupils. Parents’ educational qualification contributes meagrely in the Cognitive Abilities of the pupils.

5.7. SUGGESTIONS FOR FURTHER RESEARCH

The results of this present study put forth the probable perceptions and are anticipated that the study would pave way for further research in the following areas:

1. The study can be conducted among specially challenged children and children with learning disabilities.
2. Studies can be conducted to explain variation in academic achievement with general cognitive ability and specific cognitive abilities.
3. Research may be conducted on parental influence in the development of cognitive abilities skills.
4. Studies can be made on the relation between pupils learning behaviour and cognitive ability skills.
5. The pupils may be made to practice on the learning packages on the Verbal, Quantitative and Non-verbal Abilities and tested among various levels of pupils.
6. The role of personality and its relation on Cognitive Ability may be studied.
7. Studies can be conducted on Cognitive styles and learning Strategies and its impact upon Academic Achievement.
8. Similar study may be conducted with primary, high and higher secondary school pupils and college students also. Studies may also be conducted at various school levels in future.
5.8 CONCLUSION

The study has been made to investigate the acquisition of Verbal, Quantitative and Non-Verbal Abilities and its relationship with Academic Achievement of Eighth Standard Pupils. The Cognitive Ability Test assessment helps to define and focus on individual pupils needs more effectively. The test provides insight to the stakeholders over and beyond academic achievement test scores, about crucial cognitive skills like verbal reasoning, nonverbal reasoning and quantitative reasoning. It is clear from the findings that such test facilitates educators and teachers to assess pupils’ linguistic skills, manipulation skills, flexibility, speed of perception, and ability to recognise and remember skills. This particular type of tests helps to find out the language acquisition and mathematical ability, which are easier to acquire through extensive exposure and practice. It provides guidance to educators so that they may make the most out of the assessment data. Such types of tests detect potential learning problems.

More reading should be enhanced. All these tests assist in predicting the academic achievement of the pupils selected for the study. Cognitive Ability tests maps pupils’ strengths, reveal hidden abilities, and point the way to new learning opportunities. Gifted and Talented placement information will be provided. Good exposure and practice related to the subjects will improve their Cognitive Abilities. Reasoning abilities has considerable correlations with learning and problem solving, both in and out of the school. Cognitive Ability test measurement of three different content domains ensures that educators receive a balanced view of each pupil. It anticipates the pupils’ achievement on entrance exams. Developing pupils’ skills in Cognitive Ability test helps them to take up state and national level competitive exams like SLAS, NAAS, TRUST, NMMS, etc. Cognitive Ability test offers inclusiveness, equity, and fairness for all pupils.