6.1 Statement of the Problem

One of the problems that every teacher faces is coping with failure of students to acquire the knowledge and skills. Despite their most sincere efforts teachers are bewildered to see that the students are not able to learn certain skills and concepts. Helping such students becomes imperative though all teachers may not be equipped to handle such problems. Educational Psychology has concentrated mainly on the processes of learning, individual differences and other psychological factors that are likely to affect academic achievement. One such area is intelligence. Intelligence has been defined as the ability to learn. But it is not just one ability. There are a number of factors that form the collective intelligence of a person. Among the researchers who analysed intelligence, Guilford (1967) came up with 120 factors (later increased to 150 factors) that form a Structure of Intellect. These factors are spread over three broad categories, namely, Operations, Contents and Products. For each of them several components have been recognised. All these categories work in combination to form different factors. Thus, we have Cognition (Operation) of Semantic (Content) Units (Products) and so on.

Listing of such a comprehensive base for intelligence has helped researchers to relate intelligence factors to curriculum planning and students' learning (Meeker, 1969). Meeker discusses at length the curricular implications of each of the factor listed by Guilford.
One area that seems to have a lot of bearing of these factors is Reading Comprehension. Among the several influencing factors, those with the Semantic Content could be of great relevance to Reading for reading is a process of making sense of the print. Hence, thirty factors based on the Semantic Content were chosen for this study. The study is titled as follows:

**A Study of Guilford’s Semantic Abilities Associated with Reading Comprehension in Kannada.**

**6.2 Variables**

*Independent Variables*

The following independent factors were considered in the study:

1. Semantic-Cognition factors
2. Semantic-Memory factors
3. Semantic-Convergent Production factors
4. Semantic-Divergent Production factors
5. Semantic-Evaluation factors

*Dependent Variables*

The dependent variable considered in the study was **Reading Comprehension in Kannada.**

**6.3 General Objectives**

The present study was designed with the following six broad objectives in view:

1. To study the relationship of selected Semantic abilities with Reading Comprehension in Kannada.
2. To determine the relative efficiency of the different Semantic abilities in predicting changes in Reading Comprehension in Kannada.

3. To investigate the direct and indirect effects of a set of Semantic abilities on Reading Comprehension in Kannada.

4. To identify the clusters of Semantic factors in terms of their contributions to variations in Reading Comprehension in Kannada.

5. To compare Reading Comprehension of students at different levels of Semantic abilities.

6. To study the association of the Operations – Cognition, Memory, Convergent Production, Divergent Production and Evaluation under Semantic content as a whole with Reading Comprehension in Kannada.

The broad objectives of the study are restated in terms of Specific Objectives. The first broad objective is restated in terms of Specific Objectives 1 to 5, the second in terms of 6 to 10 Specific Objectives, the third in terms 11 to 15 Specific Objectives, the fourth in terms of 16 to 20 Specific Objectives, the fifth in terms of 21 to 25 Specific Objectives and the sixth in terms of 26-28 Specific Objectives. In all 28 Specific Objectives were set up in the present study.

6.4 Research Hypotheses

In pursuance of the Specific Objectives 1-5 stated above, the following research hypotheses were set up:
1. There is a positive and significant relationship between Cognition of Semantic abilities of students and their Reading Comprehension in Kannada.

2. There is a positive and significant relationship between Memory of Semantic abilities of students and their Reading Comprehension in Kannada.

3. There is a positive and significant relationship between Convergent Production abilities of students and their Reading Comprehension in Kannada.

4. There is a positive and significant relationship between Divergent Production abilities of students and their Reading Comprehension in Kannada.

5. There is a positive and significant relationship between Evaluation abilities of students and their Reading Comprehension in Kannada.

In pursuance of the Specific Objectives 11-15 stated above, the following research hypotheses were set up:

6. There exists a joint effect of cognitive abilities, viz., CMU, CMC, CMR, CMS, CMT and CMI on Reading Comprehension in Kannada.

7. There exists a joint effect of memory abilities, viz., MMU, MMC, MMR, MMS, MMT and MMI on Reading Comprehension in Kannada.

8. There exists a joint effect of convergent production abilities, viz., NMU, NMC, NMR, NMS, NMT and NMI on Reading Comprehension in Kannada.

9. There exists a joint effect of divergent production abilities, viz., DMU, DMC, DMR, DMS, DMT and DMI on Reading Comprehension in Kannada.
10. There exists a joint effect of evaluation abilities, viz., EMU, EMC, EMR, EMS, EMT and EMI on Reading Comprehension in Kannada.

In pursuance of the Specific Objectives 21–25 stated above, the following research hypotheses were set up:

11. There exists a significant difference in Reading Comprehension between different levels of Cognition abilities.

12. There exists a significant difference in Reading Comprehension between different levels of Memory abilities.

13. There exists a significant difference in Reading Comprehension between different levels of Divergent Production abilities.

14. There exists a significant difference in Reading Comprehension between different levels of Convergent Production abilities.

15. There exists a significant difference in Reading Comprehension between different levels of Evaluation abilities.

In pursuance of the Specific Objectives 26 and 28 stated above, the following research hypotheses were set up:

16. There is a positive and significant relationship between each of the Operations – Cognition, Memory, Convergent Production, Divergent Production and Evaluation as a whole under Semantic Content and Reading Comprehension in Kannada.

17. There exists a joint effect of Operations – Cognition, Memory, Convergent Production, Divergent Production
and Evaluation as a whole on Reading Comprehension in Kannada.

6.5 Scope of the Study

The study was confined to Dakshina Kannada district. The study covered, 11 Mahithi Sindhu Secondary Schools (376). Further, the study involved Reading Comprehension of students at class VIII level.

The present study covered all the 30 factors under the Semantic Content involving the Operations - Cognition, Memory, Convergent Production, Divergent Production, Evaluation and the Products - Units, Classes, Relations, Systems, Transformations and Implications as identified by J.P. Guilford in the Structure of Intellect model.

6.6 Method of Research

The study is a causal comparative and analytical study.

6.6.1 The Sample

The sample for the study consisted of 376 students from 11 schools from D K District, two each in four revenue Taluks and three in Mangalore Taluk, which is the largest of the Taluks. All the schools identified were Mahithi Sindhu Schools. These schools run computer training programmes for students. Each class gets four periods for learning computers. There are at least two batches in each of the classes. Thus, when one batch is on training, the other batch is free. The researcher intended to consider these students as his sample. Administration of tests to these batches would not disturb the school routine. Since the number of students from each class is reduced by half, monitoring and supervision also becomes easy. Out of the two schools identified in a Taluk, one was an urban
school and another rural. These specifications were kept in mind only to ensure a reasonable spread of the sample all over the district. Considering the vastness of Mangalore Taluk, two rural schools were selected. The demographic considerations were not made a part of the study. So the researcher accepted whatever sample he got without manipulating its composition.

6.6.2 Data Collection Tools

Since the available test for the assessment of Guilford's Convergent Production factors are in English and cannot as such be administered to students studying in Kannada medium schools, separate tests on 30 Structure of Intellect factors relating to Semantic Content were developed and validated by the researcher in Kannada language using standard procedures. A Reading Comprehension test also had to be developed by the researcher as standardised Reading Comprehension tests in Kannada were not available.

The following tests were developed using scientific procedure:

i. Guilford's type tests on Structure of Intellect factors relating to Semantic Content.

ii. A Reading Comprehension test in Kannada.

6.6.3 Collection of Data

Once the sample schools were short listed, the researcher wrote letters to the heads of those schools to permit him to conduct the tests and collect data. A format of consent letter to be filled and signed by the head of the school was also sent in a self-addressed and stamped cover. Two of the schools approached did not respond. So different schools had
to be identified. Once the consent letters were received, the researcher supplied all the test papers in separate packets. There were five Structure of Intellect tests and one Reading Comprehension test. The six tests were to be conducted during the Computer Training periods to the batches that remained in the class. The researcher personally talked to the heads of the schools and the teachers identified for administering the test and briefed the procedure and clarified doubts. The researcher collected their contact phone numbers and left his phone number and e-mail ID with them. Incidentally, most them later on communicated with the researcher through e-mail.

The teachers were given sufficient time to administer the tests. The researcher personally monitored the process of conducting the tests. The teachers were requested to arrange the answers scripts in the alphabetical order and keep them in the packet. Once all the tests were conducted, the researcher collected them from the schools.

The answers were scored with the help of the scoring key prepared. The scores were entered in MS Excel Spreadsheet for analysis purposes.

6.6.4 Statistical Techniques Used

In pursuance of the General Objective–1, the Pearson’s Product-Moment Coefficient of Correlation technique was used to find the relationship between predictor variables and the criterion variable. Further, the obtained r values were tested for significance using 't' test.

In pursuance of the General Objective–2, the Multiple Regression Analysis (normal) was used with the different independent variables fitted
into a Regression equation. This provided an indication about the relative potency of variables under consideration. The relative contribution of the independent factors to the criterion variable was calculated by multiplying regression coefficients with the correlation coefficients and converting the same into percentages.

In pursuance of the General Objective-3, the Path Analysis was used in order to calculate the direct and indirect effects of independent variables on the dependent variable.

In pursuance of the General Objective-4, the Principal Component Factor Analysis was used with a view to find out the combination that accounts for maximum variation when all the variables are in the linear combinations with each one as distinct identify by itself.

In pursuance of the General Objective - 5, the Analysis of Variance was used with a view to compare Reading Comprehension of students between different levels of Semantic Abilities.

In pursuance of the General Objective - 6, all the above techniques were used with a view to find out the association of all the operations under Semantic content as a whole with Reading Comprehension in Kannada.

### 6.7 Major Findings

1. There is a positive and significant relationship between the abilities Cognition of Semantic Units (CMU), Cognition of Semantic Content (CMC), Cognition of Semantic Systems (CMS), Cognition of Semantic Transformations (CMT), Cognition of Semantic Implications (CMI) and Reading Comprehension of students. However, there is no significant relationship between the ability Cognition of Semantic Relations (CMR) and Reading Comprehension of students.
2. The value of multiple R of linear regression equation for Cognition factors is 0.5353, which suggests that estimation of Reading Comprehension is possible on the basis of four predictor variables, namely, CMU, CMR, CMT and CMI.

3. About 28.67% of the criterion variable is accounted for by the six cognitive factors in case of Reading Comprehension of students.

4. The contribution of factor CMR to Reading Comprehension is negative. The factor CMI seems to be the best predictor of Reading Comprehension among all the predictor variables (Cognitive factors).

5. There is a significant direct positive effect of Cognition of Semantic Units (CMU), Cognition of Semantic Transformations (CMT), Cognition of Semantic Implications (CMI) on Reading Comprehension of students in Kannada.

6. There is no significant direct effect of Cognition of Semantic Classes (CMC) and Cognition of Semantic Systems (CMS) on Reading Comprehension of students in Kannada.

7. There is a significant direct negative effect of Cognition of Semantic Relations (CMR) on Reading Comprehension of students in Kannada.

8. There is a significant indirect effect of Cognition of Semantic Units (CMU) on Reading Comprehension of students in Kannada through CMR, CMT and CMI.

9. There is a significant indirect effect of Cognition of Semantic Classes on Reading Comprehension of students in Kannada through CMR, CMS, CMT and CMI.

10. Cognition of Semantic Relations, though has a significant direct negative effect on Reading Comprehension, through CMU and CMC it has a significant indirect positive effect on Reading Comprehension of students in Kannada.
11. Cognition of Semantic Systems has a significant indirect positive effect on Reading Comprehension of students in Kannada through CMC, CMT and CMI.

12. Cognition of Semantic Transformations has a significant indirect positive effect on Reading Comprehension of students in Kannada through CMU, CMC, CMS, and CMI.

13. Cognition of Semantic Implications has a significant indirect positive effect on Reading Comprehension of students in Kannada through CMU, CMC, CMS and CMT.

14. There is a positive and significant relationship between all the abilities under Operation Memory, i.e., MML, MMC, MMR, MMS, MMT, MMI and Reading Comprehension of students in Kannada.

15. The value of multiple linear regression equation which is 0.5261 suggests that estimation of Reading Comprehension is possible on the basis of three predictor variables, namely, MMR, MMT, and MMI.

16. 27.68 per cent of the variations in the Reading Comprehension can be accounted for by the six Memory factors in case of Reading Comprehension of students.

17. The factor MMT seems to be the best predictor of Reading Comprehension of students in Kannada among all the predictor variables (Memory factors).

18. There is a direct negative effect of Memory of Semantic Units on Reading Comprehension of students in Kannada, though not significant.

19. There is no direct effect of Memory of Semantic Classes on Reading Comprehension of students in Kannada.

20. There is a significant direct positive effect of Memory of Semantic Relations and Memory of Semantic Implications, on Reading Comprehension of students in Kannada.
21. There is no significant direct effect of Memory of Semantic Systems on Reading Comprehension of students in Kannada.

22. There is a significant indirect effect of Memory of Semantic Units on Reading Comprehension of students in Kannada through MMC, MMR, MMS and MMI.

23. There is a significant indirect effect of MMC on Reading Comprehension of students in Kannada through MMT.

24. There is a significant indirect effect of MMR on Reading Comprehension of students in Kannada through MMU, MMS and MMT.

25. There is a significant, indirect positive effect of MMS on Reading Comprehension of students in Kannada through MMU, MMC, MMR, MMT.

26. There is a significant, indirect positive effect of MMT on Reading Comprehension of students in Kannada through MMC, MMR, MMS and MMI.

27. There is a significant indirect positive effect of MMI on Reading Comprehension of students in Kannada through MMT.

28. There is a positive and significant relationship between all the abilities under Operation Convergent Production, i.e., NMU, NMC, NMR, NMS, NMT, NMI of Semantic Units and Reading Comprehension of students in Kannada.

29. The value of multiple linear regression equation which is 0.5640 suggests that estimation of Reading Comprehension of students in Kannada is possible on the basis of five predictor variables, namely, NMU, NMC, NMR, NMS and NMT.

30. 31.81 per cent of the variations in the Reading Comprehension can be accounted for by the six convergent production factors in case of Reading Comprehension of students in Kannada.
31. There is a significant direct positive effect of abilities of 
Convergent Production of Semantic Units, Convergent 
Production of Semantic Classes, Convergent Production of 
 Semantic Relations, Convergent Production of Semantic 
Transformations on Reading Comprehension of students in 
Kannada.

32. There is no significant direct effect of abilities of Convergent 
Production of Semantic Implications on Reading 
Comprehension of students in Kannada.

33. There is a significant indirect effect of abilities of Convergent 
Production of Semantic Units on Reading Comprehension of 
students in Kannada through NMC, NMR and NMS.

34. There is a significant indirect effect of abilities of Convergent 
Production of Semantic Classes on Reading Comprehension of 
students in Kannada through NMU, NMR, NMS, NMT and 
NMI.

35. There is a significant indirect effect of abilities of Convergent 
Production of Semantic Relations on Reading Comprehension of 
students in Kannada through NMU, NMC, NMS, NMT and 
NMI.

36. There is a significant indirect effect of abilities of Convergent 
Production of Semantic Systems on Reading Comprehension of 
students in Kannada through NMU, NMC, NMR and NMT.

37. There is a significant indirect effect of abilities of Convergent 
Production of Semantic Transformations on Reading 
Comprehension of students in Kannada through NMC, NMR 
and NMS.

38. There is a significant indirect effect of abilities of Convergent 
Production of Semantic Implications on Reading 
Comprehension of students in Kannada through NMC, NMR 
and NMS.
39. There is a positive and significant relationship between the ability Divergent Production abilities, i.e., DMU, DMC, DMR, DMS, DMT, DMI and Reading Comprehension of students in Kannada.

40. The value of multiple linear regression equation which is 0.5328 suggests that estimation of Reading Comprehension is possible on the basis of four predictor variables, namely, DMU, DMR, DMS and DMT.

41. 28.38 per cent of the variations in the Reading Comprehension can be accounted for by the six divergent production factors in case of Reading Comprehension of students in Kannada.

42. There is a significant direct positive effect of abilities of Divergent Production of Semantic Units, Divergent Production of Semantic Relations, Divergent Production of Semantic Systems and Divergent Production of Semantic Transformations on Reading Comprehension of students in Kannada.

43. There is no significant direct effect of abilities of Divergent Production of Semantic Classes and Divergent Production of Semantic Implications on Reading Comprehension of students in Kannada.

44. There is a significant indirect effect of abilities of Divergent Production of Semantic Units on Reading Comprehension of students in Kannada through DMC, DMR, DMS, DMT and DMI.

45. There is a significant indirect effect of abilities of Divergent Production of Semantic Classes on Reading Comprehension through DMU, DMR, DMS, and DMT. DMC has a negative indirect effect on Reading Comprehension of students in Kannada though DMI.

46. There is a significant indirect effect of abilities of Divergent Production of Semantic Relations on Reading
Comprehension of students in Kannada through DMU, DMC and DMI.

47. There is a significant indirect effect of abilities of Divergent Production of Semantic Systems on Reading Comprehension of students in Kannada through DMU, DMC, DMT and DMI.

48. There is a significant indirect effect of abilities of Divergent Production of Semantic Transformations on Reading Comprehension of students in Kannada through DMU and DMS.

49. There is a significant indirect effect of abilities of Divergent Production of Semantic Implications on Reading Comprehension of students in Kannada through DMU, DMR and DMS. There appears to be a slight indirect effect through DMC.

50. There is a positive and significant relationship between the abilities EMU, EMC, EMR, EMS, EMT, EMI and Reading Comprehension of students in Kannada.

51. The value of multiple linear regression equation which is 0.4653 suggests that estimation of Reading Comprehension of students in Kannada is possible on the basis of three predictor variables, namely, EMU, EMR and EMI.

52. 21.65 per cent of the variations in the Reading Comprehension can be accounted for by the six evaluation factors in case of Reading Comprehension of students in Kannada.

53. There is a significant direct positive effect of abilities of Evaluation of Semantic Units, Evaluation of Semantic Relations on Reading Comprehension of students in Kannada.

54. Evaluation of Semantic Implications has a direct positive effect on Reading Comprehension of students in Kannada though not significant.
55. There is no significant direct effect of abilities of Evaluation of Semantic Classes and Evaluation of Semantic Systems on Reading Comprehension of students in Kannada.

56. There is a direct negative effect of abilities of Evaluation of Semantic Transformations on Reading Comprehension of students in Kannada.

57. There is a significant indirect effect of Evaluation of Semantic Units on Reading Comprehension of students in Kannada through EMC, EMR, EMT and EMI.

58. There is a significant indirect effect of EMC on Reading Comprehension through EMU and EMR. Interestingly the direct effect of EMC on Reading Comprehension of students in Kannada is not significant at all.

59. There is a significant indirect effect of EMR on Reading Comprehension of students in Kannada through EMU, EMC, EMT and EMI.

60. There is no indirect effect of EMS on Reading Comprehension of students in Kannada through any of the Evaluation factors.

61. There is a significant indirect effect of EMT on Reading Comprehension through EMR and EMI. Interestingly, EMT has a negative direct effect on Reading Comprehension of students in Kannada though the effect is not significant.

62. There is a significant indirect positive effect of EMI on Reading Comprehension of students in Kannada through EMU, EMR and EMT. None of the other indirect influences of EMI on Reading Comprehension are significant.

63. There is a positive and significant relationship between the operations Cognition, Memory, Convergent Production, Divergent Production, Evaluation and Reading Comprehension of students in Kannada.
64. The value of multiple R of linear regression equation which is 0.7887 suggests that estimation of Reading Comprehension of students in Kannada is possible on the basis of three predictor variables, namely, Cognition, Memory and Convergent Productions.

65. 62.21 per cent of the variations in the Reading Comprehension of students in Kannada can be accounted for by the Operations – Cognition, Memory and Convergent Productions.

66. There is a significant direct positive effect of abilities of Operations Cognition, Memory, Convergent Production on Reading Comprehension of students in Kannada.

67. There is a direct negative effect of Operations Divergent Production and Evaluation on Reading Comprehension of students in Kannada.

68. There is a significant indirect effect of Operation Cognition on Reading Comprehension through Operations – Memory, Divergent Productions, Convergent Productions and Evaluation. It is interesting that though Divergent Production and Evaluation have a negative direct effect, through do influence Reading Comprehension of students in Kannada indirectly thorough Cognition.

69. There is a significant indirect effect of Operation Memory on Reading Comprehension of students in Kannada through Operations – Cognition, Convergent Production and Evaluation.

70. Operation Divergent Production, though has a direct negative effect on Reading Comprehension, through Cognition, Convergent Production and Evaluation it has a significant indirect positive effect on Reading Comprehension of students in Kannada. This shows that divergent thinking is a part and parcel of the reading process.
71. Operation Convergent Production has a significant indirect positive effect on Reading Comprehension of students in Kannada through Operations Cognition, Memory, Divergent Production and Evaluation.

72. Operation Evaluation, though has a direct negative effect on Reading Comprehension, through Cognition, Memory, Divergent Production and Convergent Production it has shown a significant indirect effect on Reading Comprehension of students in Kannada. This probably shows that the evaluation factors are inbuilt in any reading process.

73. Principal Component Analysis has helped in identifying five principal factors as listed below
   1. Generative Reading Ability (GRA).
   2. Factual Reading Ability (FRA)
   3. Categorical Reading Ability (CRA)
   4. Logical Reading Ability (LRA)
   5. Evaluative Reading Ability (ERA)

74. The comparison of Reading Comprehension scores between different levels of has given an 'F' value of 149.0284. This shows that the three groups with varying degrees of Cognition scores differ significantly in their Reading Comprehension scores of students in Kannada.

75. The comparison of Reading Comprehension scores between different levels of has given an 'F' value of 39.5962. This shows that the three groups with varying degrees of Memory scores differ significantly in their Reading Comprehension scores of students in Kannada.

76. The comparison of Reading Comprehension scores between different levels of has given an 'F' value of 49.8303. This shows that the three groups with varying degrees of Divergent Production scores differ significantly in their Reading Comprehension scores of students in Kannada.
77. The comparison of Reading Comprehension scores between different levels of has given an ‘F’ value of 54.9293. This shows that the three groups with varying degrees of Convergent Production scores differ significantly in their Reading Comprehension scores of students in Kannada.

78. The comparison of Reading Comprehension scores between different levels of has given an ‘F’ value of 33.1798. This shows that the three groups with varying degrees of Evaluation scores differ significantly in their Reading Comprehension scores of students in Kannada.

6.8 Discussion of Findings

That there were practically no studies on this topic could be an interesting starting point for a discussion. The reasons for such a lacuna probably lies in the developments that have taken place in theories pertaining to intelligence. There have been attempts to analyse Intelligence more holistically, making broad categories. Successful intelligence is said to involve three aspects that are interrelated but largely distinct: analytical, creative, and practical thinking (Sternberg, 1998). Even Gardner’s theory considered the concept of intelligence in contrast to the conception of intelligence by psychometricians (Gardner, 1983). While these theories make a serious attempt to understand the nature of human intelligence, it may be noted that Guilford’s view has not received the kind of attention it should have received. Guilford’s model has more implications for school education than any other model for a variety of reasons. First of all, these factors are established through statistical techniques bringing to them objectivity. Secondly, Guilford’s thinking starts with broad categories which have a functional utility. The
SOI is arranged such that if at all a researcher observes the existence of a factor other than the ones already listed, he/she can easily tag it on to the already existing model. The model is all encompassing. Guilford himself raised the number of factors from 120 to 150 making a subtle difference in the Figural Content area. This openness in Guilford's model has not been appreciated and exploited by educationists for improving school education. This is evident if we consider the fact that there have been successful commercial efforts to train intelligence and reading skill or any other skill as well as to develop tests based on SOI factors. SOI Systems™ developed by Mary Meeker and Robert Meeker(1997) is be a good example for this. SOI applies the Structure of Intellect to learning—general education, reading instruction, remedial education, gifted education, training and retraining, and career counselling. SOI is applicable to all of these diverse areas because it identifies how human intelligence and its development (or lack of development) are related to demands of learning. The analysis of intelligence in the SOI model need not be considered as an end in itself. This detailed factoria' analysis could be used for the purposes of enhancing learning.

Education is applied Psychology. Our concern is not to engage in sorting out the theoretical stands on concepts. We are more concerned with the application of these theories for improving the quality of education imparted in schools. In this context, revisiting the SOI model seems to be much more meaningful because of the precision with which it approaches the concept of intelligence.
While a positive correlation between SOI Semantic factors and Reading Comprehension in Kannada does not pose much difficulty in understanding the processes of Reading Comprehension in Kannada, the factors that do not correlate or negatively correlate offer ample scope for a good amount of discussion. It becomes important to understand why a reading process differs from a normally hypothesised type. Understanding a process also implies understanding the deviations from it. The discussion in the following lines basically aims at understanding the contradictions that have arisen in the course of this study.

Analysing multiple correlation coefficient in the present study, it was noted that CMR has a negative impact on Reading Comprehension. It was found to cause a significant reduction in Reading Comprehension in Kannada. Isn't Cognition of Semantic Relations important for Reading Comprehension? CMR refers to the ability to see relations between ideas or meanings of words. This phenomenon needs more probing. As such, in any reading exercise, seeing relations between ideas or meanings is the crux of comprehension. There might be a possibility that CMR cannot be accounted for through disparate items, as suggested by Guilford. It may require a more holistic approach to identify the correlation between Reading Comprehension in Kannada and CMR. However, it may be noted that CMR has not very significantly made a difference in principal component analysis. This may be due to the fact that CMU, CMC, CMT and CMI in a way have aspects of CMR. A transformation can take place only when we know the kind of relation between two units. We can arrive at implications only if we know the relations working among different units or classes. To find out if CMR is redundant, a separate study may have to
be undertaken. It may also be true that CMR is redundant only as far as Reading Comprehension in Kannada is concerned. It may also be possible that the tests constructed by the researcher lacked the strength to specifically explore the correlation between CMR and Reading Comprehension. Further probing can make this conflict clear. Meanwhile, CMU has recorded a significant indirect positive effect on Reading Comprehension in Kannada through CMR. Perhaps units get their meaning through well defined relations. At this point one could logically arrive at this conclusion: relations as such may not have an independent existence as far as Reading Comprehension in Kannada is concerned. Meaning emerges in reading when different factors of intelligence have their influence at a time on the reading process. Meaning about relations can also make sense by analysing the transformations or implications in which case CMR per se is likely to have less and less say in the processes of Reading Comprehension in Kannada.

The present study revealed that all the memory factors have shown significant bearing on Reading Comprehension in Kannada. Memory of units, classes, relations, transformations and implications seem to provide an ideational anchorage to the reader in comprehending the text. MMT has a contribution of 19.57 per cent to Reading Comprehension in Kannada while MMU has a negative contribution to the extent of -0.32 percent. This clearly shows how memory of discreet, unconnected units is meaningless to a reader unless they are transformed as the situation demands in order to make continuous sense of the text that is being read. The issue of transformation could be the ability to see the old issues in some new light. By definition MMT means the ability to remember
changes in meaning or redefinitions. Every memory undergoes a process of continuous adjustment. It is like asking 'what was it like when we saw it last?' The most recent memory is crucial. It is a cumulative total of the memories until then. The real meaning of MMT in terms of its implications for Reading Comprehension in Kannada need to be explored. Do we allow students to transform their memory continuously? In other words, do we help them update? It is evident that one of the known problems in teacher education is responding to the need for updating. How is it that the knowledge that a person acquires at some point of time, remains without getting transformed or updated? The answer is quite simple: they have not been trained in it. The fact that 19.57 per cent of the criterion variable in this study is accounted for by MMT throws open before us a totally new area of thinking pointing to the direction that our reading programmes need to take.

In this study the convergent factors have shown a significant bearing on Reading Comprehension. Reading Comprehension in Kannada at the literal level depends on the reader's ability to converge the meanings at some point. NMS seems to contribute maximum to Reading Comprehension in Kannada. Similarly DMS has the maximum contribution and DMI, though not minimum in that category, less. NMI seems to contribute the least. The reasons are perhaps obvious. Thinking of any implication boarders on some creative thinking and some amount of evaluation which are not really in the purview of Convergent production. The expression 'convergent' needs a little more elaboration here. It is a relative term. We talk about convergent thinking of a person in relation to that of others. For an individual, internally, there could be a lot of creative
thinking done. But the tendency of that creativity might be to converge on a generally accepted path. The process of generation of an idea is creative for the individual. But that the idea does not carry anything new is a social comment made keeping in mind the context in which the idea is generated. NMI is a creative process at the individual level and a converging process at the social level. This may be the reason why NMI has the least contribution to Reading Comprehension. Students may not be capable of generating anything new. NMR and NMC have an indirect effect on Reading Comprehension in Kannada through NMI. NMI has an indirect effect on Reading Comprehension in Kannada through NMC, NMR and NMS. CMI has the maximum contribution to Reading Comprehension in Kannada and next maximum is from EMI. MMI and DMI have less contribution and NMI, the least. This gives an interesting cross sectional analysis. In any Reading Comprehension in Kannada, cognition is the most important aspect. Naturally CMI takes the top most position as far as reading is concerned. Evaluation again calls for thinking of implications. Memory is needed for comprehending whatever is read at present. But Convergent or Divergent Productions have not shown much significance for Reading Comprehension in Kannada because Reading Comprehension in Kannada at the school level perhaps does not call for a deeper comprehension. This gives rise to many questions.

1. Isn't it necessary to train students in these two areas, i.e., NMI and DMI?

2. At what level do the learners get exposure to these two areas?
3. Would this lacuna account for the poor reading habits and Reading Comprehension in Kannada among the college students, as generally observed?

4. To what extent are NMI and DMI important for a good Reading Comprehension?

The first three questions probably depend on the answer to the fourth question. That the students have the exact meaning of what they are reading is really not so important as their ability to make intelligent guesses (Rivers, 1968). Meaning gets generated when the readers interact with the text. Readers are actively involved in the comprehension process and the whole aim is to reduce the uncertainty (Smith, 1973). In this light, the two factors, CMI and DMI assume a lot of significance. To think what would happen at the end involves competencies related to both these factors. A reader converges on particular points and diverges on several others. Both these abilities together help the reader to construct a meaning that is specific to his/her experiences. Thus, training in NMI and DMI will take Reading Comprehension in Kannada one step ahead. This missing link needs to be re established in our reading programmes.

The first three questions raised above get their answers in the above discussion. When a particular behaviour is a part of a good reading habit, it is only reasonable that learners are trained in it right from the beginning, however humble the effort is.

In this study the principal component factor analysis seems to have put the divergent factors in the first principal component factor (GRA), memory factors in the second (FRA), cognition factors in the third (CRA),
convergent production in the fourth (LRA) and evaluative factors in the fifth (ERA). The prominence of divergent factors goes well with the theories put forth by Rivers (1968) and Smith (1973) that reading is actively engaging oneself with the text and reducing uncertainty. This factorial analysis has brought more precision to these theories, basically paving way for a classroom teacher to take further action in order to design better reading programmes for students.

List of best predictors in the present study from all groups are CMI 11.89%, MMT 19.57%, NMS 10.23%, DMS 8.20% and EMI 8.57%. This cross-sectional thinking provides some insights into the processes of Reading Comprehension in Kannada. In Reading Comprehension, it is the memory that gets transformed to comprehend the implications of the cognition. The implications of meaning derived are also evaluated. The preoccupation of Reading Comprehension in Kannada is basically with meaning systems. Units, Classes and their Relations come within the system. The comprehension could either converge on a point or diverge from a point of understanding.

The analysis such as the above, gives an entirely different view of Reading Comprehension in Kannada than the traditionally held notions. The question is not 'what is comprehended', but 'how something is comprehended'. Thus, looking at Reading Comprehension in Kannada from the point of view of Structure of Intellect focuses the efforts at teaching reading on the processes of reading rather than on the product. In reading, it appears that a good product is an outcome of a good process. As applied psychologists, our concern is teaching reading for
which we are making use of the factors of intelligence. Reconsidering Reading Comprehension in Kannada from the angle of Structure of Intellect perhaps needs more attention especially because it is going to be helpful to classroom teachers for developing better reading skills.

6.9 Conclusions

Based on the major findings of the study, the following conclusions are drawn.

1. All the Semantic factors except Cognition of Semantic Relations (CMR) show a positive and significant relationship with Reading Comprehension in Kannada.

2. Estimation of Reading Comprehension in Kannada is found to be possible on the basis of the predictor variables CMU, CMR, CMT, CMI, MMR, MMI, NMU, NMC, NMR, NMS NMT, DMU, DMR, DMS, DMT, EMU, EMR and EMI.

3. About 28.67 per cent of the variations in the Reading Comprehension in Kannada are accounted for by the cognitive factors, 27.68 per cent by the memory factors, 31.81 per cent by the convergent production factors, 28.38 per cent by the divergent production factors and 21.65 per cent by the evaluation factors.

4. There is a significant direct positive effect of abilities CMU, CMT, CMI, MMR, MMI, NMU, NMC, NMR, NMT, DMU, DMR, DMS, DMT, EMU, EMR on Reading Comprehension in Kannada.

5. There is no significant direct effect of CMC, CMS, MMC, MMS, NMI, DMC, DMI, EMC, and EMS on Reading Comprehension in Kannada.

6. There is a direct negative effect of abilities of CMR and MMU on Reading Comprehension in Kannada of students.
The direct negative effect of CMR is found to be significant.

7. There is a direct negative effect of Operations Divergent Production and Evaluation on Reading Comprehension in Kannada.

8. The indirect effects of all the factors on Reading Comprehension in Kannada were studied. Most of the factors did have indirect effect on Reading Comprehension in Kannada through other factors. However, DMC, which does not have a significant direct effect on Reading Comprehension in Kannada, did show a negative indirect effect on Reading Comprehension in Kannada through DMI. Similarly CMR though has a significant direct negative effect on Reading Comprehension in Kannada, through CMU and CMC it has a significant indirect positive effect on Reading Comprehension in Kannada.

9. Principal Component Analysis has helped in identifying five principal factors, namely, Generative Reading Ability (GRA), Factual Reading Ability (FRA), Categorical Reading Ability (CRA), Logical Reading Ability (LRA), and Evaluative Reading Ability (ERA).

10. The scores on each of the independent factors were used for classification of groups into Above Average (AA), Average (A) and Below Average (BA) groups, whereas scores on dependent factor, i.e., Reading Comprehension in Kannada were used for comparison. It was found that the scores of Reading Comprehension in Kannada differed significantly between levels of scores for all the operations, i.e., Cognition, Memory, Convergent Production, Divergent Production and Evaluation.
6.10 Educational Implications

This study has made an attempt to look at the concept of reading from the angle of semantic factors of intelligence as put forth in the Structure of Intellect model. SOI has been known to be a model useful for teaching reading and remedial work in classrooms (Meeker, 1997). Considering the potential of this model for developing reading comprehension, this study was undertaken to probe into the correlation between Reading Comprehension in Kannada and Semantic factors of Intelligence. The study has proved quite useful and developed many insights into the processes of reading comprehension. The implications of the study are listed below.

1. Understanding Reading in terms of the intelligence factors gives more precision to the analysis of the reading process. The Semantic factors have shown significant correlations with Reading Comprehension. Understanding the reading behaviour has now become more precise and we could talk about the same in terms of SOI factors.

2. The precision achieved in the process of the study is helpful in identifying problem areas for the learner and remedy the same. The SOI factors have already been defined and factor analysed. This study establishes their correlation with Reading Comprehension. The factors which show a high correlation only mean that they have a significant bearing on Reading Comprehension. In other words, a person good at a particular competency relating to a particular factor could be equally good at Reading Comprehension too. Similarly, a student who faces problems in reading could be trained in specific factors of intelligence which
influences reading achievement. Reading problems could be analysed very specifically in terms of these intelligence factors. Semantic factors open up thirty different possibilities for analysing a mistake. A student who is not able to perceive the 'cause and effect' relations is actually deficient in just one dimension—seeing implications (Meeker, 1969). Tracing down a problem to such specific factors makes remedial work more meaningful to the teacher as well as the taught.

3. An initial training in the Semantic factors of Intelligence could enhance the Reading Comprehension of students at later stages. Such training could be the forerunners for a comprehensive reading programme later on. Training in these factors will bring students out of the stereotype environment of the learning situation and fill them with new vigour and enthusiasm. It would be easy for a teacher to plan activities for enhancing these intellectual abilities as they are specifically defined.

4. Standardised training material could be made available to teachers for enhancing the abilities related to Semantic factors of intelligence. As these factors are universal, standardisation would remain meaningful to all. However, this is not possible with Reading Comprehension straightaway because the processes of reading differ significantly from individual to individual.

5. Evolving of a standardised training programme in intelligence factors which relate to Reading Comprehension has many implications for improving the quality of education. Reading is the most important aspect of any educational endeavour. However, reading programmes have not seen much success inside the classrooms, in regular teaching
hours because classroom teachers are not so very well qualified to give their students individualised reading programmes. Even if this is possible, it would require huge amount of time and complicated planning. The present study opens up a different possibility in this area. It goes a little deeper into the subject and tries to tackle the very factors that influence the reading behaviour of students. The essence of intelligence factors remain the same in individuals though their outward manifestations could be different. Reading behaviour is the outward manifestation of the deeper structures of intelligence. Probing into such deeper structures helps educational planners arrive at more universal strategies for training. This can reduce the training botheration to a large extent and enable the simple classroom teacher to take on the challenge of developing reading skills more meaningfully.

6. The deeper structures of the factors of intelligence could have bearing on the learning of other subjects too. If such studies are undertaken, probably it would be easier to arrive at an integrated curriculum for school education that has been the talk of the day.

7. This study has also opened new vistas in the study of intelligence. Understanding intelligence per se and understanding intelligence for a definite purpose are two different concerns. The latter is very pragmatic and useful in social contexts. There is a need to develop application oriented knowledge so that whatever knowledge is discovered becomes useful to the society directly.

8. Application level analysis of intelligence factors in terms of their influence on Reading Comprehension integrates knowledge and provides for a more holistic understanding of both intelligence and reading
processes. While compartmentalised approach ends up in a horizontal growth, the integrated approach facilitates vertical growth of human knowledge.

6.11 Suggestions for Further Study

The present study has a small coverage (N=376). Perhaps this should be treated as a prelude to a larger study that needs to be undertaken in future. This study has shown how the Semantic factors of Intelligence correlate with Reading Comprehension and what the implications are of such correlation. Similarly there could be many other possibilities for studies which emerge from this study. Such possibilities are presented in the following lines.

1. Though this study has generally showed a positive correlation between Reading Comprehension and Semantic factors of intelligence, there are some factors like the CMR which have negative influence. CMI and DMI, though have a lot of bearing on Reading Comprehension, have not emerged as the major predictors of Reading Comprehension. Perhaps these findings need more probing. There is a need to take up each of the factors for a more detailed study. Each of the Semantic factors could be correlated with the results of a more comprehensive Reading Comprehension test to reconsider the results of this study.

2. The SOI factors could be considered for a more detailed study with regard to their correlation with subjects of study at the school level. The intelligence factors are the mental facilities that a person has and they manifest in quite a number of ways. To study the interrelationship between subjects of study and
these factors would help the classroom practitioner improve his/her professional competencies.

3. This study limited itself to students of class VIII who belong to the age group 13-14. Would a similar study give the same results with a different age group? Would that lead to the designing of totally different training programmes for different age groups? Would it be possible for us to design common programmes for the students of all age groups? Such questions need more probing to get verified answers.

4. This study has arrived at five principal factors after the principal component factor analysis. Another study could be undertaken to see how these five factors correlate with reading comprehension.

5. A reading programme could be planned based on the present findings. Such an effort would be immediately useful to classroom teachers for improving Reading Comprehension among their students.

6. The findings of the present study are a result of the correlation between the first language of students and the Semantic Intelligence Factors. Do the results hold good for a second language situation also? The present second language learning situation in India is very confused both in terms of content and pedagogy. A study of this kind would give a definite direction to the teaching of second language in this country.

7. Remedial reading programmes could be organised and tested for their validity. Designing and try out of a remedial reading programme by itself could be a very useful study.
8. There is a need to revisit Guilford more seriously from the classroom angle. Improving the classroom practices could be the first aim of such studies than theory building.

9. Meta research could be undertaken to bring together all the research done on the SOI factors and see whether they relate to theory building or improving practice. This is necessary to provide a clear cut direction to the future studies.

10. A study could be undertaken to define all the Semantic factors considered in this study more specifically with relation to reading behaviour. This would help even an ordinary person understand the processes working behind the reading behaviour better.