CHAPTER II

REVIEW OF RELATED LITERATURE

2.1 Overview

In this chapter, the researcher attempts to review various studies already undertaken with an aim of listing the relevant variables for the present study and finding out the existing gap in the knowledge on aptitude, intelligence, learning ability (style) and academic achievement of the students. It consists of four sections. The first section is an overview of the entire chapter. The second section briefly brings out the need for the review of related literature. The third section reviews a number of studies related to this present research undertaken in India and abroad and cross-cultural studies. The fourth section analytically sums up the areas and findings of studies undertaken earlier by other researchers in the form of a table. This chapter attempt to survey and critically review studies related to the investigation chosen for the study.

2.2 Need for the Review of the Related Literature

The survey of related literature is an essential aspect of research studies. The researcher has to enquire up-to-date information about what has been already investigated. The problem can be better understood and better viewed in different perspectives.
According to Best, (1986) “A brief summary of previous research and writing of recognized experts provide evidence that the research is familiar with what is already known and what is still unknown and untested”.

The related literature shows the way to the sources of significant ideas, theories and hypotheses, problems and previous methods of research and background for selections of the problem. Comparative research is based upon past knowledge which helps to eliminate the duplication to what had been done already and provides useful suggestions for significant investigation. It also throws much light on the scientific and systematic approach to the present investigation.

Hence an attempt was made by the researcher to survey the related literature in order to identify the studies conducted similar to the present study.

2.3. Studies Related to the Present Study

2.3.1. Studies done in India

Misra S. (1967) carried out a study to assess variations of intelligence with occupational training course, age, sex and locality one part of sample consisted of 288 students from different schools and colleges of Aligarh. The subjects were distributed over the range of courses taught from class ten to undergraduate standard for one of the experimental design in the study. For the other experimental design the sample consisted of 306 men from different professional course of Aligarh University. The first sample was for the study of variation of intelligence with reference of age, sex and locality of the second sample was for the variation of intelligence and attainment with reference to occupational training course. The data were collected with the help
of the Vernon’s Intelligence Test and Raven’s Progressive Matrices. The study revealed that the highest score were fifteen year olds and the lowest scorers were fourteen year olds and the medium scorers were sixteen, seventeen and eighteen year olds, boys did significantly better than girls.

**Wig N.N and Nagpal R.N (1971)** undertook a comparative study on intelligence and academic performance among successful and failed students, post graduate medical research institute Chandigarh. The sample consisted of eighty-two students of age group nineteen to twenty-four years. Out of these forty one students were selected from a group who had failed in 1966-67 and had joined the university. The rest, forty-one students were those who had passed in 1966-67. Instruments which were used in this study are academic score of these students and Raven’s Progressive Matrices Test scores. Findings were revealed that there is positive correlation between intelligence and academic performance.

**Vibha (1974)** studied relationship of learning with fluid and crystallized test scores of the high school children. The sample consisted of 245 boys from class nine. The age of boys ranged from twelve to sixteen years. The data were collected by the Hundal’s General Mental Ability Test and Raven’s Progressive Matrices. The analyses were done to find the structural relationship among the learning variables and other variables used in study. The findings were as follows, it was found that serial learning and paired associate tasks were moderately correlated. However miniature learning tasks involving verbal mediation and associated with school
learning shows higher correlation with measures of crystallized learning than with those of fluid learning.

**Gangopadhyay P.K. (1975)** studied social intelligence and its relationship with abstract and mechanical intelligence. The total sample of 1,112 students was selected from the five Universities of Gujarat by random sampling technique. The tools employed were Raven’s Progressive Matrices test and Ganguli’s test of social intelligence. The findings were that boy and girls did not differ significantly in the performance on the social intelligence test.

**Ramaligaswami P. (1975)** studied intelligent measurement among Indian adults sponsored by National council of educational research and training. In Delhi 604 persons between the ages of 15 to 45 years, belonging to the both sexes, educational level fifth to college level and residents of Delhi were taken as a sample. The Wechsler Adult Intelligence Scale was used as an instrument. Results of the preliminary studies revealed that very wide difference in the response of the illiterate and the literate population exist and the performance tests were most suited for Indian condition. The trend of results of inter test correlation and reliability was most instance and essentially similar with that of WAIS. Factor analysis showed a general factor present to a high degree in all the tests and in additional factor was revealed.

**Gakhar S.K and Wahi (1978)** carried out a study on creativity and intelligence as predictor of academic achievement. The study samples were 150 girls
from three Government girls higher secondary schools out of which 109 retained. Instruments used were Torrence test of creative thinking, Jalota’s test of intelligence, Raven’s Progressive Matrices and final examination scores of eighth and ninth standard. Results were 43.78% of academic achievement variance can be attributed general intelligence and creativity. 49.99% to verbal intelligence, 5.61% is non-verbal intelligence, 1.11% to verbal creativity and 1.48% to non-verbal creativity. It is concluded that both creativity and intelligence significantly predict academic achievement.

Desai K.G (1980) carried out a research on comparative factorial structure of Raven’s Standard Progressive Matrices, Cattell’s culture fair scale three and Desai-Bhatt Group test of Intelligence on a sample of various sub-culture of Gujarat under Journal of psychological research. The 338 subjects of eighth grade from eight schools of different subculture samples were selected under purposive sample method. Raven’s and Cattell’s scale showed greater fluid loading than other non-verbal test, which distinctly showed an additional verbal factor similar to crystallized intelligence.

Sharma H and V. Aggarwal (1981) studied cognitive task in relation to intelligence and school achievement under journal of institute of educational research, Delhi. 200 students of ninth class from schools of Chandigarh were based on a cognitive task test and then random chosen constituted the sample of study. Instruments used were Jalota’s test of intelligence, achievement test on cognitive
tasks and achievement scores in the middle standard examination of the U.P board of school education. The study was enhanced with factorial design involving two independent variables of intelligence and academic achievement. The findings are total school achievement did not have significant relationship with the performance on cognitive task. The interaction between intelligence and school achievement has significant impact on the performance in cognitive task only at the knowledge level and not at the comprehension level in the application level.

**Yadav R. (2000)** studied the Vocational Preferences of Adolescents in Relation to their Intelligence and Achievement in Relation to their Intelligence and Achievement. Objectives: (1) to find out the vocational preferences of the study; (2) to find out the relationship of vocational preferences with intelligence and achievement. Method: Descriptive survey method as well as qualitative approach was adopted for the study. The sample taken was 200 intermediate students of four intermediate colleges of Agra, using probability sampling method for the study. The tools were R.K. Tandon’s Group Test of Intelligence; Thurston’s Interest Schedule; and Achievement Test used for data collection. Findings: (1) The students preferred administrative jobs than job related music and artistic. (2) Highly intelligent students prefer to go to jobs related to the area of physical sciences. (3) Average and below average intelligence groups did not differ significantly in any of the area.

**Pada, M. (2000)** analyzed the “Relationship between Academic Achievement and School Interventions of Class nine students”. Objectives: (1) To find out the
effect of school interventions on academic achievement in different categories of schools; (2) to assess interrelationship between academic achievement and interpretations provided in different categories of schools. Method: Descriptive survey method as well as qualitative and quantitative approaches was adopted for the study. The sample was taken as 55 Headmasters and 550 students of Class nine from different categories of schools in the district of Phenkani, Orissa, using probability sampling method for the study. The tools were used such as achievement test of annual examination. Findings: (1) All categories of school differed significantly from one another as regards the academic achievement of the learners. (2) There is no significant difference in school intervention score between government and non-government schools (3) There is no significant relationship between academic achievement and school intervention in government and nongovernment schools. (4) There is marked relationship between academic achievement and school intervention in the schools managed by ST and SC Development Department. It concluded that there was no significant relationship between academic achievement and school intervention in the schools of Dhenkanai district. Ten references were cited in the study.

Kaur M. (2001) studied Self-concept in Relation to Intellectual Variables, Objective: To find out correlation with the values of self-concept and independent variables such as intelligence, creativity and achievement of rural and urban schools. Method: Descriptive school survey method as well as qualitative approach was adopted for the study. A sample of 510 girls students (230 rural + 280 urban),
studying in Class nine, from Punjab, using probability sampling for the study. Tools were used: (1) Children self-concept scale (Ahluwalia, 1986), (2) Group Test of General Mental Ability (Jalota, 1972), (3) Creative Activities Checklist (Torrance, 1982), and (4) Academic Achievement Test. Findings: (1) Variable of intelligence and creativity to be positively significant with self-concept in urban as well as in rural. (2) No correlation found between the variable of achievement and self-concept. (3) It is revealed that variable of achievement contributed 13.6% variance in predicting the self-concept of urban girls. (4) It is clear that conjoint effect of variable of intelligence creativity of achievement is higher in both the samples as compared to predicting the self-concept. Eight references were cited in the study.

Vyas, A. (2002) studied “Learning Style, Mental Ability, Academic Performance and Other Ecological Correlates of under Graduate Adolescent Girls of Rajasthan”. Objectives: (1) to compare the academic performance of students in respect of different learning styles; (2) to study the effect of ecological correlates on the academic performance of girls students; (3) to study the interactive effect of mental ability and learning styles on academic performance of girl students; (4) to study the interactive effect of ecological correlates and learning style on academic performance of girls. Method: A sample of 500 girls from Class XII of 16 Government Sr. Secondary schools of Baran, Bundi, Jhalawar and Kota District in Rajasthan was taken. Under the ecological category the investigation had selected the area (urban/rural) and the level of parent’s education, their occupation and income. The tools used include Learning Style Inventory by K.K. Rai and K.S Narual, Mental
Ability Test by S. Jalota, SEs Scale by R.A. Singh And S.K. Saxena and academic performance marks obtained by the students in board examination. The statistical techniques used were Mean, Standard Deviation, ‘t’ test and ‘F’ test for data analysis. Findings: (1) The environmental, emotional, sociological dimension of learning style does not affect significantly the academic performance of girls. (2) Residence as urban/rural and ecological correlates has significant affect on the academic performance of girls. Parents’ education, occupation and income do not affect significantly the academic performance of girls. (3) The environmental dimension of learning style preference does not affect the academic performance whereas mental ability influence the academic performance of students. (4) An ecological factor namely, residence and its interaction with environmental has found significantly contributing towards the better learning style of academic performance.

**Malathi S. and Malini E. (2006)** studied “Learning Style of Higher Secondary Students of Tamil Nadu”. Objectives: (1) to find out the learning style of students in Classes XI and XII; (2) to find out the relationship of learning style with achievement of students; (3) to see the learning style of higher secondary students in terms of their sex, classes and type of school. Method: The sample consisted of 160 higher secondary students from private and government schools. The tools used in this study for data collections were Felder’s Learning Style Inventory by Barbara A. Soloman, Cronbach’s alpha test, and ‘t’-test was used for data analysis. Findings: The
learning style of higher secondary students was found to be good and there was no significant difference in the learning style of higher secondary students in terms of their class and type of school. There was significant difference in the learning style between boys and girls studying in higher secondary schools and the correlation is higher between learning style and achievement which indicates that higher the achievement scores, the better the learning style among higher secondary students.

The study cites twelve references.

### 2.3.2. Studies Done Abroad

**Sally A. Carless (Taken from Thesis -1972)** did a study on *The Validity of Scores on the Multidimensional Aptitude Battery* The purpose of the present study was to examine the factor structure of the Multidimensional Aptitude Battery (MAB) and also the extent of overlap between the MAB and the Wechsler Adult Intelligence Scales–Revised (WAIS-R). The sample consisted of 55 men and 30 women who were administered the WAIS-R and the MAB. Factor analysis showed that the MAB assesses two distinct aspects of intelligence: verbal and performance abilities. The validity coefficients indicated there was substantial overlap between the WAIS-R and MAB Verbal, Performance, and total scale scores. However, four of the ten MAB subtests did not correlate with the WAIS-R subscales they were designed to represent. It was concluded that the MAB is a suitable alternative to the WAIS-R when an indication of verbal, performance, or general abilities is required; however, the MAB should not be used when detailed information is required on specific abilities.
Ralph Hakstian and Richard W. Bennet (Taken from Thesis -1972) did a Validity Study Using the Comprehensive Ability Battery (Cab): II. Relationships with the DAT and GATB A. Three multiple-abilities batteries—the Comprehensive Ability Battery (CAB), Differential Aptitude Tests (DAT), and General Aptitude Test Battery (GATB)—are briefly discussed, and results of a study involving cross-correlations of the tests in these batteries are presented. The measures included are 11 of the 20 CAB tests, plus two simple composite measures, all eight of the DAT tests, plus two composites, and seven of the eight paper-and-pencil tests of the GATB, plus the GATB general composite measure. The results are based on one sample of males and one of females from predominantly middle and upper-middle class homes in a large city. In addition to between-battery correlations involving tests and composites, criterion-related validity results are also given with yearend course grades as criteria and with the various composite measures as predictors.

A study was conducted to investigate sex differences in spatial visualization in a sample of Kuwaiti school children (Taken from Thesis -1972). Two hundred and thirty-five pupils (109 boys and 126 girls) aged from five to nine years participated in the study. Experimental stimuli were used as a spatial visualization test. The data clearly showed that boys performed better than girls on the spatial visualization test. Their superiority resulted from a greater facility to encode shapes in general, rather than from a greater facility to specifically encode shapes in the orientations in which they were presented.
Robert Semmes and Mark L. Davison (Taken from Thesis -1972) did a study on A Test of the Speed-Level Hypothesis in the Domain of Numerical Reasoning. Suppose a person were asked to answer a set of cognitive test items that were all of the same type (e.g., all verbal analogies) but varied with respect to their difficulty. If the person were given a stringent time limit within which to answer the items, would the person’s total number-correct score measure the same ability (or abilities) as would be measured were the person allowed to answer the items without time constraints? We approached this problem as a test of the level-only hypothesis vs. the speed-level hypothesis. Level is the ability that, under self-paced performance conditions, mediates accuracy on tasks drawn from a homogeneous task domain. Speed is a hypothetical cognitive ability, distinct from level, that is postulated to co-mediate (with level) sufficiently time constrained performances of tasks drawn from a homogeneous task domain. The level-only hypothesis and our null hypothesis states that, on tasks sampled from a homogeneous task domain, a single cognitive ability, level, mediates performance under both self-paced performance conditions and time-constrained performance conditions. The speed-level hypothesis and our alternative hypothesis states that, on tasks sampled from a homogeneous task domain, when item time limits are sufficiently short, then, in addition to a level ability, one or more speed abilities mediate performance. We constructed two approximately equivalent test forms, V and W, consisting of 40 free-response numerical reasoning items. Both forms were administered by computer to each member of two independent samples of college students. One of the samples took form V under self-paced conditions and form W under experimenter-paced conditions. Under experimenter paced testing,
each test item had an assigned and pre-announce time limit. The other sample took form W under self-paced conditions and form V under experimenter-paced conditions. Two latent variable models were fit to each sample’s combined self-paced and experimenter-paced item accuracy scores. One of the models yielded a level of performance score for each examinee and the other model yielded both a level of performance score and a speed of performance score for each examinee. We will present the two models we fit to our data, estimates of score reliabilities, and validity evidence for both level and speed scores. We will also discuss how our approach to eliciting a speed of performance dimension might be improved. The most widely accepted model of the structure of human cognitive abilities is John Carroll’s (1993) model does not recognize the existence of separate speed and level abilities within specific cognitive task domains. Carroll was aware of this possible deficiency, but our work appears to be the only research since Carroll’s book aimed at investigating whether the structure of cognitive abilities is more complicated than most abilities researchers currently suppose. Because most existing tests of so-called ability within narrowly defined task domains are administered with a time limit, the science of human cognitive abilities would almost surely be strengthened if researchers were to pay much closer attention to the conditions of task performance.

**Pasdaran, Babolsar, Iran Rohani, Abdullah (Taken from Thesis -1972)** studied Intelligence and Gender as Predictors of Academic Achievement among undergraduate students and found that there has been significant discussion concerning the causal preference of intelligence, gender and academic achievement.
A number of researchers’ have examined intelligence, gender and academic achievement as equal constructs. Others consider that intelligence and gender as predictors of academic achievement are reciprocal. At a standstill, others emphasize that intelligence and gender predict to achievement. This study examined intelligence and gender as predictors of academic achievement among undergraduate students. Participants (N= 153, 105 = male & 48= female) completed intelligence test and the cumulative grade point average (CGPA). The finding showed a lower correlation independent variables (score of intelligence and gender) and CGPA in this study. A multiple regression analysis revealed an interesting pattern of relationship. Further, multiple regression analyses indicated that intelligence and gender explained 0.019 of the variance in academic achievement.

Marley W. Watkins and Chris G. Greenawalt and Catherine M. Marcell (Taken from Thesis -1972) did a study on Factor Structure of the Wechsler Intelligence Scale for Children–Third Edition among Gifted Students Factor analysis was applied to the Wechsler Intelligence Scale for Children–Third Edition (WISC-III) scores of 505 gifted students to evaluate the construct validity of the WISC-III with this population. Multiple criteria were used to determine the number of factors to retain for principal axis extraction. A two-factor solution that roughly mirrored the verbal comprehension and perceptual organization factors of the WISC-III normative sample appeared to be most supportable. Arithmetic, Picture Arrangement, and Coding subtests failed to contribute to this solution. These results are consistent with the hypothesis that subtests that emphasize speed of responding are not valid for
gifted children and suggest that an alternative WISC-III composite score, the General Ability Index, may be a better summary of ability for gifted students.

Lee Willerman, Joseph M. Horn, and John C. Loehlin (1976) studied about the Aptitude-Achievement Test Distinction: A Study of Unrelated Children Reared Together - Unrelated children reared together (N = 156) in 71 different families included in the Texas Adoption Project were compared for similarities on intelligence and achievement tests. The purpose was to see if a distinction between the two types of tests based on their heritability could be sustained. Results indicated no substantial differences in correlations for the two types of tests, and hence little or no support for the notion of an aptitude achievement distinction based on differential heritability.

According to Simon, (1977) found that imagery has an important function in highly abstract mathematics tasks, particularly under conditions of low programming, where the task is novel, unstructured or unusually complicated.

Verwey and Wolmarans (1983) during the development of the Junior Aptitude Test, found significant correlations between the subtests and achievement in Grades seven, eight and nine. In Grade seven, the Reasoning, and Memory for meaningful information, subtests explained between 32% and 39% of the variation in first language achievement. Mathematics achievement was best explained by the number ability and reasoning subtests which accounted for between 40% and 42% of
the variance in achievement. The Synonyms subtest accounted for between 40% and 52% of the variation in first language achievement in Grade eight. Mathematics achievement in Grade eight was explained by the Number Ability and Synonyms subtests, which explained between 29% and 32% of the variation in performance. The highest correlations with first language achievement in Grade nine were obtained in the Reasoning and Synonyms subtests. The two tests accounted for between 26% and 46% of first language achievement. Verbal reasoning abilities, as well as knowledge of words and their meanings are therefore considered to be important in Grade nine language achievements. Mathematics achievement was best accounted for by the Number Ability and Memory for paragraph subtests, which explained between 6% and 27% of the variance. The ability to work quickly and accurately with numbers, and the ability to remember meaningful information, can therefore be regarded as important in mathematics achievement in Grade nine. Science achievement was best explained by the General Reasoning and Number Ability tests of the JAT which explained between 20% and 31% of the variance.

Linn and Petersen (1985) in their meta-analysis found that sex differences in visual-spatial ability were large only for mental rotation, medium for spatial perception and small for spatial visualization. However, it appears that the discovery of a sex difference in visual-spatial ability is highly dependent on the specific nature of the ability. In the current study, spatial visualization was defined in line with Linn & Petersen's (1985) definition, which states that 'spatial visualization is the label commonly associated with those spatial ability tasks that involve complicated, multi-
step manipulations of spatially presented information' (p. 1484). According to Linn & Petersen, school children revealed no gender differences in spatial ability. Current published data on sex differences in spatial perception is inconclusive. In particular, there are no convincing data on the spatial visualization skills of young children; consequently, it is thought that such differences may be absent. This study was conducted to investigate sex differences in spatial visualization in a sample of Kuwaiti school children. Two hundred and thirty-five pupils (109 boys and 126 girls) aged from five to nine years participated in the study. Experimental stimuli were used as a spatial visualization test. The data clearly showed that boys performed better than girls on the spatial visualization test. Their superiority resulted from a greater facility to encode shapes in general, rather than from a greater facility to specifically encode shapes in the orientations in which they were presented.

**Connor and Serbin (1985)** found contradictory results in their study of spatial visualization among 13- and 16-year-olds. They argue that it seems fair to conclude that junior and senior high school males will perform better than females on some visual-spatial measures, some of the time.

**Armstrong (1985)** found that 13-year-old girls even performed significantly better than boys in spatial visualization.

**Kaufmann and Helstrup (1985)** also emphasize the importance of spatial visualization in mathematical-quantitative ability, particularly for complex problems.
The effect of visual-spatial ability on mathematical achievement is particularly pronounced at higher grade levels. They found that when spatial visualization (defined as the ability to manipulate visual images mentally) was statistically controlled for, sex differences in college students' mathematical ability became non-significant.

**Kruger and Bester (1989)** carried out a study in which only 17.7% of the variance in academic achievement in Afrikaans-Nederland’s III at university, was explained by the Senior Aptitude Test and the final matriculation examination combined. Certain variables appear to influence the effectiveness of aptitude tests. The period of time that elapses between testing and the measurement of achievement, lower the prediction of students’ later performance. The researchers explain that the reason for this may be due to the long period of time between the measurement of aptitude and the measurement of performance in Afrikaans-Nederland’s III which took place three, or in some cases, four years later.

**Van der Westhuizen, Monteith and Steyn (1989)** found that aptitude, as measured by the Academic Aptitude Test, explained only 15.3% of the variance in achievement in the matriculation examinations. A similarly low prediction of achievement was found in a study investigating variables contributing to the academic achievement of black Grade 12 students. The researchers in this study maintain that it was difficult to make predictions of achievement in black populations at that time, due to the influence of non-test factors, such as educational
disadvantages. Another factor that may play a role in lowering the predictive function of aptitude tests is an inadequate command of the language in which the aptitude and achievement tests are administered (Huysamen 1999, Van Eeden, De Beer & Coetzee 2001).

**Kaufmann (1990)** theory analyzes that imagery has an important function in highly abstract mathematics tasks, particularly under conditions of low programming, where the task is novel, unstructured or unusually complicated. Research findings also suggest that the functional utility of imagery (visual-spatial representational processes) increases with increasing task difficulty.

**Torney-Purta (1990)** in a summary of research activities in international studies concluded that the major comparative studies in education were carried out by the International Assessment of Educational Progress (IAEP), the International Association for the Evaluation of Educational Achievement (IEA), and a group of professors at the University of Michigan and the University of Chicago. To date, among those most recent studies reported to the public are the second International Assessment of Educational Progress (IAEP) completed in 1991 (Lapointe, Askew, & Mead, 1992); the Second IEA Science Study (SISS) conducted in the mid-1980s (Keeves, 1992; Postlethwaite & Wiley, 1992; Rosier & Keeves, 1991); and a set of publications developed by Stevenson and his colleagues at the University of Michigan and other institutions (Stevenson & Stigler, 1992). In all of those studies, significant gender differences in Chinese students' mathematics or science
achievement were identified (Lapointe, Askew, & Mead; Postlethwaite & Wiley; Stevenson, 1992). Torney-Purta (1990) emphasized that "although newspaper headlines have reported the major findings of these international studies, the details of methodology of the actual research have gender differences in educational achievement were examined in a cohort of 1265 individuals studied from birth to age 25. There was a small but pervasive tendency for females to score better than males on standardized tests and to achieve more school and post-school qualifications. The differences could not be explained by differences in cognitive ability as males and females had similar IQ scores. Teacher ratings of classroom behavior revealed that males were more prone to inattentive, restless and distractible behaviors and aggressive, antisocial and oppositional behaviors than females. When the associations between gender and measures of educational achievement were adjusted for teacher ratings of classroom behavior the gender differences were reduced substantially. These results suggest that one approach to reducing gender differences in educational achievement lies in improving classroom.

Keefe and Ferell (1990), Languis (1998), Lemire (1996) and O'Neil (1990) studied that over the past few decades; the concept of learning style has gained credibility as a construct that affects not only individual students' learning preferences, but also their respective successes and failures in schooling situations. Because student success in developmental education programs relies heavily on learning performance in a variety of large-group, small-group, and individual learning situations, it behooves developmental education instructors and learning assistants to
examine the relationships between student learning styles and these instructional contexts. This article uses Gregory’s (1982) cognitive learning constructs as the basis for translating learning style theory into the following developmental education teaching practices: teacher-led lesson presentations, student group presentations and projects, independent assignments, and testing situations.

**Tartre (1990)** study did not reveal sex differences in spatial visualization either in her middle school or in her high school studies.

**Thompson, Detterman and Plomin (1991)** conducted an investigation to ascertain the correlations between different measures of intelligence and achievement in reading, mathematics and general language tasks from Grades one to six. The researchers found that the correlations between verbal ability and achievement were higher than correlations between other measures of intelligence, for example, spatial ability and achievement. Verbal intelligence was measured using the WISC-R vocabulary test and a verbal fluency test. The correlation of verbal intelligence and achievement in reading was 0.40, in mathematics 0.32 and in language achievement 0.34. Verbal ability therefore accounted for between 10% and 16% of the variance in achievement. The high correlations found between verbal intelligence and school achievement show that knowledge of the meanings of words, as well as the ability to access associated words in memory quickly, and articulate them fluently, are important in academic achievement at school.
Thompson et al. (1991) carried out a study on spatial intelligence, as measured by a spatial relations test and a hidden patterns test was found to be a good predictor of scholastic success in reading and mathematics. Spatial intelligence was, however, a less powerful predictor than verbal ability of achievement in the general language area. Spatial ability was found to have a correlation with reading of 0.40, with mathematics of 0.32 and with language of 0.33. In the study carried out by Marais (1992) it was found that nonverbal factors were important in predicting achievement in mathematics. The total score on the intelligence test, that is, the combination of the verbal and non-verbal intelligence scores, was the strongest predictor for Mathematics in this study. A correlation of 0.36 was found between the total intelligence score and Mathematics, explaining 13% of the variance in achievement. Similarly, the full scale score on the Senior South African Individual Scale - Revised (Van Eeden 1997) was found to have a higher correlation with Mathematics achievement than the verbal score (0.48 as opposed to 0.44). The subject of accountancy also showed a higher correlation with the full scale score on the SSAIS-R than with the verbal scale score (0.43 as opposed to 0.41). General Science showed equal correlations of 0.51 between achievement and both the verbal scale score and the full scale score. A measurement of the total intelligence of a learner can therefore predict 23% of the variance in mathematics achievement, 18% of accountancy achievement and 26% of achievement in general science in Grade nine. The above results show that the ability to do mathematics, accountancy and general science appears to require the contribution of both verbal and nonverbal abilities. Non-verbal intelligence alone does not appear to predict scholastic
achievement better than either verbal intelligence on its own, or a combination of verbal and nonverbal intelligence.

**Thompson (1991)** study showed that cognitive processing speed is significantly positively correlated with achievement. Perceptual speed (measured by a test where a specific alphabet letter had to be found amongst other letters), showed correlations of 0.33 with Reading, 0.32 with Mathematics, and 0.36 with Language achievement. In the same study Thompson et al. (1991) found that memory abilities, as measured in tests of the recall of names and faces, as well as a picture memory test had positive, if low, correlations with achievement. The correlation of memory with reading was 0.26, with mathematics 0.22 and with language achievement, 0.22. The memory test was not as strongly related to academic achievement as were verbal intelligence, spatial intelligence and speed of processing. This implies that school learning does not rely that heavily on memorization of information but rather on more complex language abilities, spatial abilities and the rapid processing of information.

**Marais (1992)** carried out a study investigating the prediction of academic achievement in Grade seven, eight and nine learners. It was found that verbal intelligence, measured by the New South African Group Test, contributed the most to achievement in English, Afrikaans, Mathematics and Physical Science. Grade seven learners’ verbal intelligence scores were the strongest predictor of their achievement, explaining 62% of the variance in academic performance at school. Grade eight and nine learners’ verbal intelligence was significantly positively correlated with their
academic achievement. The highest correlation obtained for Grade eight and nine learners was 0.52 between verbal intelligence and Afrikaans (first language) achievement. A correlation of 0.43 was found between verbal intelligence and English (second language) achievement, and a correlation of 0.40 was found between verbal ability and Science achievement. It can be seen that for Grade eight and nine learners, between 16% and 27% of achievement in the above subjects can be accounted for by their verbal ability.

**Dunn and Dunn (1992, 1993)** identified students' preferences for 21 Learning Style (LS) variables that affect individuals: (a) immediate environment (sound, light, temperature, design); (b) own emotionality (motivation, persistence, responsibility, and structure); (c) sociological inclinations for learning alone, in a pair, with peers, with either a collegial or authoritative adult, or in a variety of ways as opposed to in a pattern or routine; (d) physiological characteristics (auditory, visual, tactual, or kinesthetic modalities, time-of-day energy levels, intake, and mobility; and (e) global versus analytic processing as determined through correlations with sound, light, design, persistence, and intake (Dunn, Cavanaugh, Eberle, & Zenhausern, 1982; Dunn, Bruno et al., 1990) A meta-analysis of 42 experimental studies conducted with the Dunn and Dunn LS model at 13 universities revealed that students whose learning styles were accommodated could be expected to achieve 75% of a standard deviation higher than students whose learning styles were not accommodated (Dunn, Griggs, Olson, Gorman, & Beasley, 1995).
Marais (1992) carried out an investigation into factors, such as intelligence, aptitude, interest and socio-economic factors that predict academic achievement during the junior secondary phase of schooling (Grades seven to nine). The Junior Aptitude subtests showing the highest contributions to achievement in the key subjects of Afrikaans, English, mathematics and science, were the Memory for Paragraphs and Synonyms subtests. The Memory for Paragraphs subtest accounted for between 2% and 8% of the variance in language achievement. Synonyms accounted for between 2% and 5% of the variance in language achievement. Memory for Paragraphs contributed 4% to the variance in achievement of mathematics, with Synonyms contributing 2%. Synonyms accounted for 3% of the variance in science achievement, and the Number Ability subtest contributed 2% to the variance in this subject. According to Marais, a contribution of 1% to the variance in academic achievement can be seen as educationally meaningful. It is therefore clear that the contributions of the aptitude subtests are both statistically and educationally meaningful. Fouché and Verwey (1994:1-82), in the development of the Senior Aptitude Tests, obtained significant correlations between the aptitude subtests and academic achievement in higher grade subjects in Grades ten, eleven and twelve. In Grade ten, the Verbal Comprehension subtest accounted for between 21% and 32% of the variance in first language achievement. The Calculations subtest explained between 21% and 25% of the variance in mathematics achievement. Verbal Comprehension accounted for between 24% and 27% of first language achievement in Grade 11. Mathematics achievement was best explained by the Writing Speed and Verbal Comprehension tests. These two tests accounted for between 9% and 24% of
the variance in achievement. In Grade 12, first language achievement was best explained by the Disguised Words and Verbal Comprehension subtests. These two tests accounted for between 24% and 29% of the variance in achievement. The Calculations and Pattern Completion subtests best explained performance in mathematics, accounting for between 20% and 30% of achievement. The above results show that language comprehension is the most important factor in predicting language achievement in the Further Education and Training phase. Mathematics prediction at this level appears more complex. The Calculations, Verbal Comprehension and Pattern Completion subtests were the most important predictors of mathematics achievement. It appears that mathematics at this level requires many different abilities such as number ability, comprehension of language and nonverbal reasoning.

Horn (1993) in their study of undergraduate university students developed a path model to show the relative influence of different variables on achievement. They found that when compared to other factors, such as previous knowledge and motivational factors, general intelligence was found to have a highly significant direct effect on achievement, independent of the other variables in the model. Intelligence showed a correlation of 0.55 with achievement, explaining 30% of the students’ performance in this study.
McGuiness (1993) study of Norwegian sixth and ninth-grade students. It has frequently been argued that boys' advantage in mathematics is rooted in a corresponding advantage in visual-spatial skills.

Lohaus, Kessler, Hoben, and Gediga (1994) reported results from a large sample of 604 children aged between 7 and 15 years, in which performance on a spatial visualization test (the Embedded Figures Test) differed greatly from performances on tests of spatial perception (the Rod and Frame Test) and mental rotation, with both of the latter showing sex differences. Sex differences in spatial visualization, which are entirely absent in subjects younger than eighteen years, are also markedly weaker than for other spatial skills in adults. Three-dimensional spatial visualization is an essential skill for geoscientists. We conducted two evaluations of students' spatial skills to examine whether their skills improve after enrollment in a geology course or courses. First, we present results of pre- and post-course survey of abstract visualization skills used to characterize the range of spatial abilities in the student population at Carleton College. In Introductory Geology, there was a correlation between those who score very poorly on the spatial survey and those who receive a grade of C or lower. Students in higher-level courses had better developed visualization skills than those in Introductory Geology. Current published data on sex differences in spatial perception is inconclusive. In particular, there are no convincing data on the spatial visualization skills of young children; consequently, it is thought that such differences may be absent.
Voyer et al. (1995) define and divide spatial skills into three categories: (i) Skills of Spatial Perception in exercises where the subjects use their own frame of reference in the judgment of spatial relationships among objects. The Rod and Frame test (Witkin, Lewis, Hertzman, Meissner, & Wapner, 1954) epitomizes such tasks. (ii) Skills of Mental Rotation in exercises where the subjects mentally rotate depictions of objects such as those of complex solids (Shepard & Metzler, 1971) or flat entities (French, Ekstrom, & Price, 1963). (iii) Skills of Spatial Visualization in exercises where the subjects mentally transform visually presented stimuli, as in the Embedded Figures Task (Witkin, Oltman, Raskin, & Karp, 1971). The meta-analyses show agreement that there are marked sex differences in the first two categories of skills, with men scoring higher than women. Such sex differences are also found in all age groups of children performing the Mental Rotation tests, but only in children over the age of 13 in the case of the Spatial Perception tests. Responses to the Spatial Visualization tests are quite distinct, as there are no significant sex differences for subjects aged less than 18 years.

Kaufmann (1996) used spatial visualization tests of the form board type as the basis for his findings also suggests that with increasing task difficulty boys, more than girls, may engage in cognitive processes of a visual kind. It should be emphasized, however, that the available research evidence is still scarce, and that the conclusions drawn should be treated as reasonable working hypotheses. In particular, there is a lack of studies testing the role of spatial visualization and students' sex with increasing mathematics task difficulty at the pre-adolescent level. The purpose of the
study is to examine sex differences in spatial visualization and mathematical achievement at the end of elementary school. Both overall sex differences in mathematical achievement and sex differences in sub samples of tasks of increasing difficulty will be examined. In models which include spatial visualization and students' sex as independent variables and mathematical achievement as the dependent variable, we wish to investigate whether mathematics task difficulty affects the relationship between the variables.

Vederhus and Krekling's (1996) observation is reinforced by a study of nine-year-old children using adaptations of adult spatial tests. They found significant sex differences in the realms of mental rotation and spatial perception, but failed to find any in the realm of spatial visualization.

Lee and Stevenson (1996) carried out a study investigating the relative contributions of intelligence, previous achievement and family factors to later school achievement in the Chinese, Japanese and American cultures. It was found that there were similar correlations between intelligence and academic achievement for each culture studied. Participants were administered intelligence tests in Grade 1 and their achievement was tested ten years later in Grade 11. The single most predictive variable for Grade 11 achievement in mathematics, reading and general knowledge was general intelligence. The study found correlations of between 0.48 and 0.53 for mathematics achievement, between 0.28 and 0.51 for reading and 0.35 and 0.44 for general knowledge.
Van Eeden (1997) carried out research using the SSAIS-R found that nonverbal scale scores showed correlations of between 0.30 and 0.43 with all the subjects taken at Grade nine level, accounting for between 9% and 18% of academic achievement. The subject having the highest correlation with the nonverbal scale was found to be mathematics (0.43). This relationship possibly reflects the use of nonverbal intelligence in the high school mathematics syllabus, with its increased visual figural content in geometry, and the measurement of dimension, such as area and volume. Information processing theories of intelligence emphasize the speed of processing information.

Van Eedens (1997) research carried out during the standardization of the Senior South African Individual Scale – Revised shows significant correlations between the verbal scores and Grade nine academic achievements. The verbal scale is an indication of verbal intelligence and comprises five subtests. The verbal subtests are:

- Vocabulary, which tests the respondent’s knowledge of the meanings of words
- Comprehension, which tests the respondent’s ability to understand and express himself or herself in language
- Similarities, which tests the ability to think abstractly
- Number Problems, which test the respondent’s ability to solve numerical problems
- Story Memory, which tests short-term auditory memory

The verbal scale score, that is the combined scores of all the verbal subtests, shows significant correlations with the subjects taken at Grade nine level. The verbal score
shows the highest correlations with the language subjects and subjects with
c onsiderable language content. A correlation of 0.53 was obtained between the verbal
 score and English achievement, and a correlation of 0.51 was found between the
 verbal score and general science. Correlations of 0.48 were obtained in both
 Afrikaans and history achievement. A correlation of 0.44 was obtained between the
 verbal score and both geography and mathematics. A slightly lower co relational
 value of 0.41 was obtained between the verbal score and the subject accountancy
 (Van Eeden 1997). The SSAIS-R verbal scale therefore shows consistently significant
correlations with academic achievement and predicts between 16% and 28% of the
variance in Grade nine academic achievements. The above mentioned studies show
the importance of verbal intelligence with regard to academic achievement, but the
results reveal that other measures of intelligence are also important in predicting
scholastic success.

**Fergusson and Horwood (1997)** who examined the links between gender and
educational achievement in a New Zealand birth cohort studied to the age of 18.
While there have been a large number of explanations of the origins of gender
differences in educational achievement, few studies have examined the extent to
which these differences are mediated by biological, sociocultural or school factors. A
theme that permeates all explanations is that gender differences in educational
achievement are largely a reflection of gender differences in classroom behavior. This
explanation is testable since it is possible to examine the extent to which gender
differences in classroom behavior explain gender differences in educational
achievement. That analysis showed the presence of small but pervasive differences in educational achievement including performance on standardized tests and achievement in school leaving examinations. These differences were explained in all cases by gender differences in teacher-reported classroom behavior. Specifically, boys were described as being more prone to inattentive, distractible and restless behavior in the classroom context and controlling for these tendencies virtually eliminated any association between gender and educational achievement.

**Bester (1998)** studied and defined that academic achievement at school is the result of a learning process which consists of thinking, learning and problem solving. Intelligence is seen as the ability to think and learn and is therefore considered to be fundamental to academic achievement. In the literature, correlations between tests of general intelligence and measures of academic performance are reported as being usually close to 0.50 (Brody 1992; Neisser, Boodoo, Bouchard, Boykin, Brody, Ceci, Halpern, Loehlin, Perloff, Sternberg & Urbina 1996) but can be as much as 0.75 (Jensen 1998). This means that 25% to 56% of the variance in academic performance can be attributed to intelligence. Many empirical investigations have shown that intelligence is the best single predictor of academic success.

**Delamont (1999)** studied School factors - A perspective focused on school factors attributes male educational underachievement to schools adopting learning and assessment procedures that are better suited to females than to males. These arguments assume that males and females possess different sets of behaviors,
attitudes and learning styles and thus require different school and teaching practices to succeed (for review, see Murphy & Elwood, 1998). In some cases, these explanations claim that teaching and schooling has become 'feminized' and schools are no longer adequately addressing boys' educational needs. In a summary of this perspective, the commonly cited ways in which schooling is considered to be feminized, including: school and classroom regimes that favor females; a lack of male teachers to act as academic role models for boys; a lack of toughness in discipline; a rejection of competition; and a bias towards feminism in curriculum materials.

Kellys (1999) study on achievement in mathematics was significantly predicted by an arithmetic aptitude test. The Arithmetic Reasoning Test (ART), measuring learners’ ability to understand basic arithmetic rules and the application of these rules to solve numerical problems, was found to significantly predict higher grade mathematics marks in secondary school. The ART showed a correlation of 0.29 to 0.65 with higher grade secondary school mathematics marks. The aptitude test, therefore, accounted for between 8% and 42% of the variance in mathematics achievement, with the highest prediction being for Grade nine, Grade ten and Grade eleven higher grade mathematics achievements. Aptitude tests administered at school level appear to predict future school performance as well as achievement in tertiary education.

Vosloo, Coetzee and Claassen (2000), during the development of the Differential Aptitude Test Form S the relationship between the aptitude tests and
academic achievement of Grade seven learners only, were measured. The single test showing the highest correlation with overall academic achievement in Grade seven was found to be the Reading Comprehension test. This test explained 50% of the variance in achievement. The emphasis on the ability to read, not only in the languages and the learning subjects such as History and Geography, but also to read instructions and understand explanations in mathematics and science, appears to be very important in the General Education phase of schooling. Reading Comprehension and Memory abilities each accounted for 43% of the variance in Afrikaans first language achievement. The ability to read with understanding, as well as to remember information is predictably important in first language achievement. English second language achievement variance was best accounted for by Reading Comprehension and the Verbal Reasoning subtest, each explaining 52% of the variance. Reading with understanding, as well as the ability to reason verbally in a relatively unfamiliar language where the learner does not know all the vocabulary and language constructions used, appears important in second language achievement. Mathematics achievement correlated highly with the Computations subtest, which accounted for 41% of the variance in Mathematics achievement. The ability to work quickly and accurately with numbers therefore had a predictable close relationship with mathematics achievement. Reading Comprehension accounted for 41% of the variance in history achievement, with memory abilities accounting for 36%, highlighting the importance of reading with understanding, as well as recalling large volumes of information in this subject. After Reading Comprehension, which accounted for 41% of the variance in geography achievement, verbal reasoning
accounted for the greatest variation, 37%. The ability to reason is important in geography, where application of information and problem solving is often necessary. It appears that an understanding of the figural content of geography, for example contour maps, draws on nonverbal abilities, as significant positive correlations were obtained with the tests for Spatial Visualization (0.46) and Mechanical Insight (0.53).

After Reading Comprehension, which accounted for 40% of the variation in Science achievement, the Nonverbal reasoning subtest accounted for the most variation, 38%. The Comparison subtest, measuring visual perceptual speed, showed the highest correlation with mathematics where the ability to see similarities and differences quickly is important. The Comparison subtest accounted for 6% of the variance in Mathematics. The correlations between the subtests of the Differential Aptitude Test Form S and academic achievement range from low to high positive correlations. It should be borne in mind that the study was carried out on a selected sample of only 61 Afrikaans speaking learners. Further studies with a more representative sample, is necessary to more precisely predict academic achievement in South African learners.

Coté and Leavens (2000) investigation emerged from the literature study which showed that intelligence is not the most important predictor of academic achievement in university students. In this study, motivation, as measured by the Student Motivations for Attending University (SMAU) Scale, appeared to be more important than intelligence, showing higher correlations with achievement than intelligence as measured by the Culture Fair Intelligence Test (CFIT). The researchers explain this unusual finding by suggesting that the university system in this study did
not engage the brightest students to achieve well but rewarded less bright students who were highly motivated. The implication of the above studies is that general intelligence can be used as a reliable predictor of academic achievement at school level. General intelligence, however, does not explain all the variance in academic achievement and other factors that play a role. One of these factors is aptitude, or specific intelligence.

**Gender differences** *(Taken from a Thesis - 2000)* Females are typically superior in verbal abilities and in items concerned with social relations. They also perceive details more quickly and accurately and do better on tests of memory. Males, on the other hand, surpass women on items that involve spatial, numerical, and mechanical performance. In scores of overall intelligence, the two sexes seem to be about equal. All differences are restricted to specific abilities, not to the composite that we call intelligence. It is debatable, however, whether the differences in specific abilities are due to biological or cultural factors.

**Janet G. Melancon** *(Taken from Thesis - 2000)* studied Reliability, Structure, and Correlates of Learning and Study Strategies Inventory Scores. The Learning and Study Strategies Inventory (LASSI) is used in hundreds of universities and high schools each year. This study investigated the reliability, structure, and criterion-related validity of LASSI scores. Data were provided by 502 university students. Results suggest that the LASSI may not measure the postulated 10 scales typically used to report results.
Marit S. Samuelstuen (Taken from Thesis - 2000) studied Psychometric Properties and Item-Keying Direction Effects for the Learning and Study Strategies Inventory-High School Version with Norwegian Students. The purpose of this study was to examine whether the Learning and Study Strategies Inventory-High School Version (LASSI-HS) would yield reliable and valid scores when using a Norwegian translation with a sample of Norwegian high school students. In addition, the author examined possible response biases associated with item-keying directions within the LASSI-HS. Three alternative factor models proposed in prior research were evaluated, with results yielding support for the model suggested by Olaussen and Bråten. However, method effects associated with item wording were found, and positively worded items were characterized by more response biases than negatively worded items for the Norwegian students.

Tara Stevens, Mary K and Tallent and Runnels (Taken from Thesis - 2000) studied the Learning and Study Strategies Inventory-High School Version: Issues of Factorial Invariance across Gender and Ethnicity. The purpose of this study was to investigate the latent structure of the Learning and Study Strategies Inventory-High School (LASSI-HS) through confirmatory factor analysis and factorial invariance models. A simple modification of the three-factor structure was considered. Using a larger sample, cross-validation was completed and the equality of factor structures was compared across gender and ethnicity. Participants for the confirmation of the three-factor model were 115 above-average-ability and average-ability seventh through ninth graders of middle and upper middle socioeconomic
status. For the cross-validation and the factorial invariance analysis, existing data from 367 ninth graders were used. Factorial invariance was found across gender but not across ethnic groups. The LASSI-HS likely offers valuable information about students’ learning strategies, but caution is warranted when making comparisons across cultural groups.

Theresa J. B. (Taken from Thesis - 2000) did a study on Gender and Language Differences on the Test of Workplace Essential Skills: Using Overall Mean Scores and Item-Level Differential Item Functioning Analyses Kline. The Test of Workplace Essential Skills (TOWES) assesses cognitive skills in three areas using the following three separate subscales: Reading Text, Document Use, and Numeracy in Working-Age Adults. The sample was composed of 2,688 working-age English speaking Canadians who came from a variety of settings (e.g., trades training programs, adult education centers, college programs, and athletic clubs). The relationships between subscale test performance and the demographic variables of gender and language showed there were some group differences in mean levels of performance. However, at most, these differences accounted for less than 3% of the variance in performance on any subscale. In addition, differential item functioning analyses using the BILOG-MG program showed that at the item level, little or no gender or language bias was present. Recommendations based on the findings are presented.
Gagné and St Père (2002), in a study comparing the predictive values of intelligence, motivation and persistence, similarly found that cognitive abilities were by far the best predictor of school achievement. In this test, it was found that intelligence correlates with an achievement of between 0.36 and 0.56, explaining 13% to 31% of the variance in achievement. Verbal ability, as measured in intelligence tests, appears to contribute most to achievement in scholastic success.

Stumpf and Stanley (2002) carried out a study in which was found that learners’ College Board Scholastic Assessment Test (SAT) scores correlated positively with their graduation from college. The Verbal score on the SAT contributed approximately 40% to the likelihood of a learner graduating from college and the Mathematics score contributed 38%.

Ruban LM, McCoach DB and McGuire JM, (2003) did a study on the differential impact of academic self-regulatory methods on academic achievement among university students with and without learning disabilities. Data were gathered using a new instrument, the Learning Strategies and Study Skills survey. The results of this study indicate that students with learning disabilities differed significantly from students without learning disabilities in the relationships between their motivation for and use of standard self-regulated learning strategies and compensation strategies, which in turn provided a differential explanation of academic achievement for students with and without learning disabilities.
Heiman T and Precel K (2003) did a study on students with learning disabilities in higher education: academic strategies profile in Open University of Israel, Department of Education and Psychology. This study compared 191 college students with learning disabilities and 190 students without learning disabilities in four main areas: academic difficulties, learning strategies, functioning during examinations, and students' perception of factors that help or impede their academic success. Analysis of the personal data of students with and without learning disabilities revealed no significant differences between groups on grade point average, number of courses taken, and family status, but students with learning disabilities reported having more difficulties in humanities, social sciences, and foreign language than students without learning disabilities. Regarding academic strategies, students with learning disabilities devised unusual strategies and preferred additional oral explanations or visual explanations, whereas nondisabled students preferred more written examples. These differences indicated that students without learning disabilities used more written techniques than did students with learning disabilities. During examinations, the students with learning disabilities had difficulty concentrating and were concerned about lack of time. They experienced stress, were nervous, and felt more frustrated, helpless, or uncertain during examinations than students without learning disabilities. The implications for college students with learning disabilities are discussed.

Aluja-Fabregat, Anton, Blanch and Angel (2004) did a study on Socialized Personality, Scholastic Aptitudes, Study Habits, and Academic Achievement. This
study analyzed the relationships among Cattellian personality factors, scholastic aptitudes, study habits, and academic achievement. A total of 887 volunteer students from primary education (453 males and 434 females), enrolled in 29 public schools, participated in this research. It was found that the scholastic aptitudes were the most predictive variables of achievement, while the personality traits had a low direct contribution to academic achievement, although the students with higher scores on socialized personality traits showed better study habits than those students with lower scores on personality socialization traits. The relationship between personality and academic achievement seems to be mediated by study habits. Moreover, females obtained higher academic achievement scores than males. These differences could be explained by the fact that females showed a more socialized personality pattern and better study habits.

Da Fonseca D (2005) [Role of the implicit theories of intelligence in learning situations] A series of studies showed that children's theories of intelligence experimentally induced will influence their tendency to persevere in the face of failure. Like normally developing children, children with mental disorders were more likely to prefer challenging activities and report high levels of interest-enjoyment when the task was presented as one which is improvable. It suggests that although children with difficulties are pessimistic about improving their intellectual capacities, if a new task is introduced in a way that highlights the possibility of self-improvement (incremental theory), then they will pursue the challenge in an adaptive manner (strong perseverance, enjoy, and important interest). These results are very
interesting. Indeed, highlighting an incremental theory had a positive motivational effect on behavior in achievement situations.

Bruni et al. (2006) examined the relationships between academic achievement and demographic and psychology factors on a sample of 380 school students. School achievement index (SAI) was used to as an instrument measure of academic achievement for this study. The school achievement (SAI) was derived by summing up four items, which were reading ability, reading comprehension, mathematics and executive ability. The mean school achievement SAI for the total sample was 11.1 (SD=2.8). The finding of the study indicated significant difference between males and females. According to this study, females had higher school achievement index (academic achievement) than males. However, other studies found that there was no gender difference in achievement (Herbert & Stipek, 2005). To summarize, there is still a gap in our knowledge of the relationship between intelligence, gender and academic achievement. While some research findings support intelligence and gender as predictors of academic achievement, others have failed to find any relationship between these three variables. The present study aims to assess the contribution of intelligence (Catell Culture-Free Intelligence Test) on academic achievement in a different population and age group (Iranian students in overseas universities). The major objective of this study was to examine intelligence and gender as predictors of academic achievement among undergraduate students. We hypothesized that there is no relative-scored between intelligence, gender and academic achievement. The present study attempts to estimate of the true association.
between gender, intelligence (using a fluid intelligence test), as predictors and academic achievement (cumulative grade point average or CGPA) among undergraduate students. This study fails to support the intelligence and gender as predictors of students’ academic achievement (CGPA). Intelligence and gender explain only 0.019 of the variance in academic achievement (CGPA scores). Partial correlations between academic achievement and IQ scores and gender were non significant at .05. Coefficients also show there is no significant between academic achievement and IQ and gender at .05. In general, this study does not give much support for intelligence and gender as predictors of academic achievement. A number of factors may be explained for this result. Ediseth (2002), which reported that a low correction between intelligence and achievement, suggested that such a finding may reflect the effect of a restricted range of intelligence at university, due to the prior selection procedures in primary and secondary education Kossowska (1999)’s study using a descriptive data suggested that there was an even distribution of the data on intelligence and examination grades. Both of these factors may be in the ‘upper level’ of the achievement scales, as compared with other non-academic subjects (Ediseth, 2002). In addition, regarding cumulative grade point average (CGPA), there are two limitations that must be kept in mind when interpreting the results of the study. First, participants (Iranian students) studying in Malaysian universities by non-nation language (English language). Second, wide age may indicate the result for this study. This study is the first study which investigates of such a wide age range, by examining intelligence test (CFIT-3a) as a determinant of academic achievement among Iranian students. This age difference of the respondents in this study may
elucidate why intelligence and gender do not predict academic achievement, as in the case of other past.

**Watkins, Lei, and Canivez (2007)** study investigated intelligence and gender as predictors of academic achievement among undergraduate students. There has been considerable debate regarding the causal precedence of intelligence and academic achievement. Some researchers view intelligence and achievement as identical constructs. Others believe that the relationship between intelligence and achievement is reciprocal. Still others assert that intelligence is causally related to achievement.

**Laidra, Pullmann and Allik (2007)** revealed that students’ achievement relied most strongly on their cognitive abilities through all grade levels. Laidra et al. (2007) investigated as predictors of academic achievement in a large sample 3618 students (1746 boys and 1872 girls) in Estonia. Intelligence, as measured by the Raven’s Standard Progressive Matrices, was found to be the best predictor of students’ grade point average (GPA) in all grades.

**Deary, Strand, Smith, and Fernandes (2007)** found a strong and positive relationship between intelligence and academic achievement. This study examined between psychometric intelligence at age 11 years and education achievement in 25 academic subjects at age 16. The correlation between a latent intelligence trait and a
latent trait of educational achievement was 0.81. General intelligence contributed to success on all 25 academic subjects.

2.4 Analysis of the Major Studies

The analyses of the major studies are done by the investigator and the following table 2.1 summarizes the studies reviewed.
2.1 Analysis of the Major Studies

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<td>200 intermediate students of 4 intermediate colleges of Agra</td>
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<td>2</td>
<td>Torney-Purta (1990)</td>
<td>1265 individuals studied from birth to age 25</td>
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<td>Grade 7, 8 and 9 learners</td>
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<td>School students</td>
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<td>380 school students</td>
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<td>Watkins, Lei, &amp; Canivez (2007)</td>
<td>Undergraduate students</td>
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<td>9</td>
<td>Laidra et al. (2007)</td>
<td>3618 students (1746 boys and 1872 girls)</td>
<td>Intelligence and Achievement</td>
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<td>10</td>
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<td>11 years to 16 years</td>
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<td>S. No.</td>
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<td>Kaur, M (2001)</td>
<td>510 girls students (230 rural + 280 urban), studying in Class IX, from Punjab</td>
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<td>22</td>
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<td>604 children aged between 7 and 15 years</td>
<td>Spatial visualization</td>
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<tr>
<td>26</td>
<td>Dunn and Dunn (1992, 1993)</td>
<td>Students</td>
<td>Learning Style (LS)</td>
</tr>
<tr>
<td>27</td>
<td>Verwey and Wolmarans (1983)</td>
<td>Grades 7, 8 and 9 learners</td>
<td>Number Ability and Reasoning</td>
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</table>
This chapter has dealt with analysis of factors which are related to academic achievement. It was stated that academic achievement is the result of activities such as thinking, learning and problem solving. The predominance of these cognitive activities in school work points to intelligence, specific aptitudes and previous knowledge as being the most important variables affecting academic achievement. General intelligence, and especially verbal ability, was found to be the most significant variable affecting academic achievement. The reason why language abilities are important becomes clear when the great extent of language usage in the classroom is considered. Specific aptitudes appear to contribute significantly to scholastic achievement, with tests of reading comprehension showing the highest correlations with the many different subjects at school level. Previous knowledge and scholastic achievement are shown to be strongly related in subjects that are strictly sequenced, and where prior learning contains basic concepts essential for later learning.

In the learning process, in addition to cognitive factors and affective factors, academic achievement has been the subject of a considerable amount of research carried out recently. The most important affective variables appear to be the learner’s subject-specific self-concepts, and his or her motivations for learning. Study habits and techniques were found to additionally explain a portion of the learner’s academic achievement. It is clear from the literature that one variable does not adequately explain the variation in achievement. A combination of variables explains a greater proportion of the variation in achievement than a single variable can do. In addition,
the combination of variables can differ from subject area to subject area and from grade to grade, which makes uniform prediction model impossibility.


Verwey and Wolmarans (1983), Stumpf and Stanley (2002) and Van der Westhuizen, Monteith and Steyn (1989) studied aptitude and achievement tests, numerical ability and reasoning aptitude.


The review of related literature shows that only few variables were analyzed and a comprehensive view of the total potential or capacity of an individual has not been analyzed and hence researcher has selected this present study.
So the present study focused on students’ of class nine, considering the potentials namely intelligence, aptitude, learning ability (style), physical fitness and academic achievement of Madurai and Virudhunagar districts.

Hence the present study “A STUDY ON MAPPING OF STUDENTS’ POTENTIAL AT HIGH SCHOOL LEVEL IN MADURAI AND VIRUDHUNAGAR DISTRICTS”.