2.01 Introduction

The review of related literature has got a vital role in every research project. It indicates the clear picture of the problem to be solved since it suggests method, procedure, source of data and statistical techniques appropriate to the solution of the problem. According to W.R Borgm “The literature in any field forms the foundation upon which all future work will be built. If we fail to build the foundation of knowledge provided by the review of related literature, our work is likely to be shallow and naive and will often duplicate the work that has been already done better by someone else”.

The careful survey of the literature enables the investigation to be well conversant with relevant theories in the field, reports and records as also all other relevant literature. Not only that, an understanding of the theory in the field enables the researchers to place their questions in perspective and through studying the related literature, investigators learnt the procedures and instruments that are useful and promising. In addition to these, review also provides some insight regarding strong points and limitations of the previous studies, which help to avoid unintentional replication of previous studies and enables the investigators to justify his own endeavour in the field.
2.02 Studies Related to Mental Health

**Veereshwar (1979)** conducted a study to examine the Mental Health and adjustment problems of college female students. Samples of 406 female students in the age group of 18-20 years were drawn from the undergraduate classes. The tools used were, Sinha and Singh’s adjustments inventory for college students (1974) and Verma’s youth problem inventory (1975). The major findings were (i) the family adjustment problems of rural and urban girls differed significantly (ii) the college was more problematic for rural girls than for the urban girls (iii) social problems exist for both rural and urban girls (iv) the personal and emotional problems differed significantly in favour of rural girls and (v) both rural and urban girls showed satisfactory Mental Health adjustment.

**Basumalik and Bhattacharya (1980)** undertook a study together from a sample of Indian respondents regarding Mental Health and compare them with the views held by Indian experts. An incidental sample of 365 laymen expressed their agreement or disagreement on a five point rating scale, with a 50 item Mental Health information questionnaire. A group of 122 Mental Health experts also indicated their approval or disapproval of items of the same questionnaire. The findings of the study were (i) responses of the laymen were not markedly different from those of the experts (ii) the older and less educated seemed to be relatively misinformed and (iii) popular information in Mental Health area was not well crystallized.
An investigation was conducted by Sinha and Bhan (1983) to compare the Mental Health of college students. The sample consisted of 293 male engineering and 259 male non-engineering students. The results of the study revealed that the engineering students were significantly superior in Mental Health than the non-engineering students.

Majid (1984) made an effort to identify the dominant factors which constituted Mental Health. The sample of the study included 210 boys and 220 girls. The tools administered were Ansari’s self acceptance scale, Ansari and Ansari’s Level of Aspiration Coding Test and Shorstrrom’s Personal Orientation Inventory. It was concluded in the study that the dominants factor was self acceptance which in fact reflected an accepting attitude of individual towards himself.

An investigation was made by Prassanna (1988) with a view of comparing the Mental Health variables of high and low achievers. The samples of the study were 567 boys and 483 girls of IX grade and they were selected from different Schools by adopting proportionate stratified random sampling technique. The tools used were (i) Mental Health status scale (ii) composite Test of generalized achievement (iii) Kerala University Group Test of Intelligence (iv) The Kerala Socio-economic scale and (vi) General data sheet. All the Mental Health variables of high and low achievers were found to differ significantly.
Zareena Anantharaman and Parthasarathy (1991) made an investigation on promotion of Mental Health in School setting in consideration of the magnitude of Mental Health problems among School going children and the paucity of Mental Health manpower in India. According to them it is important to give serious consideration to the following programmes.

i) General orientation to School teachers regarding Mental Health problems of School children and adolescents.

ii) Training in counselling skills for teachers.

iii) Problems centred promotional activities.

iv) Mental Health education to students.

v) Mental Health professionals’ interaction through parent teacher association.

Sam David et. al., (1991) made a comparative study of the Mental Health of Scandinavian and foreign students. The study involved 190 male and 118 female college students as subjects. The results showed that an increase in loneliness, sadness and worrying led to a decline in the Mental Health of the foreign students. It was also found that the Scandinavian students had better Mental Health than the foreign students.

Hinsel, Backer and Korchin (1991) conducted a cross cultural study of positive Mental Health. In this study 595 students and teachers from four countries were used as subjects. It was found that students and teachers
differed significantly in their Mental Health. The better Mental Health of the teachers was found to be attributed to their attitude towards other people, optimism good problem solving skills, autonomy and responsibility.

**Ray’s (1992)** concluded that the Mental Health of teachers was positively correlated with job satisfaction and attitude towards pupils.

Multiple roles and Mental Health status of working women were studies by **Asha (1992)** the sample consisted of 132 working women and their years of service ranged from 5 to 15 years. They were drawn from Government and quasi Government organizations having similar service conditions. Mathiew male adjustment inventory (1975) was used to assess anxiety, depression, mania and inferiority. The results revealed that working woman with multiple roles were more anxious and depressed but experienced less inferiority than those who has single and dual roles. The working women’s role performance seemed to have some impact upon their Mental Health in terms of anxiety and depression.

**Sakthivelu, S (1997)** found that a well adjusted person invariable has a liking for the worked in general and for his profession in particular. If one is able to adjust oneself with his environment-biological, physical and social, he is said to be mentally healthy driving satisfaction from what all he does. Therefore unless a teacher is well adjusted with his work environment he cannot have job satisfaction. In order to get job satisfaction teacher should be well adjusted with the inmates of his home with the members of his
community, with co-teachers to get job satisfaction. In order to get job satisfaction teacher should be well adjusted with the inmates of his home with the members of his community, with co-teachers, pupils to the people in authority controlling to the working conditions and the curricula.

**Vani and Manju (1998)** in a study entitled “sex, type of School standard and Mental Health status of high school students: found the following

i) Girls had better Mental Health status as compared to boys

ii) Mental Health status of boys of unisex Schools was low when compared to that of the boys of co-educational Schools.

**Pandey et al (1998)** in a study entitled “a study of Mental Health and decision – making capacity of higher secondary School principals found the following

i) There was significant and positive correlation between each of the dimensions of decision making and Mental Health.

ii) It was found that there existed a difference between the mean scores on Mental Health with high and low decision making capacity.

**Robert W. Roeser et.al [1999]** this study examines patterns of academic functioning and Mental Health in 184 middle School children and the relation of such patterns to their prior and subsequent functioning. Data were collected from children during their second, third, fourth, eighth, and
ninth grade School years. Cluster analyses were used to delineate patterns of academic functioning and Mental Health during eighth grade. The authors examined the relation of these patterns to academic functioning and Mental Health 1 year later the transition to high School, and then examined the long-term developmental roots of the eighth grade patterns using data collected during elementary School years. Results indicated variegated patterns of academic and emotional functioning at eighth grade and stability in these patterns across the high School transition. Some long-term continuity was found among children showing uniformly positive or negative functioning at eighth grade. Studying child functioning across multiple domains and time periods is discussed.

Claro, et al (2003) studies “Mental Health status of teachers” in Chile. The 12 question version of the Goldberg health questionnaire was applied to 139 teaches. The results showed that relationships with children were the best perceived and relationships with superiors were the worst perceived. A higher social valuation of teachers and better salaries were the two variables associated with a better satisfaction with work. The number of working hours was directly related to Mental Health problems. Conclusions of the study indicate that age and number of working hours were two risk factors for Mental Health problems. Age was independent and negatively correlated with Goldberg score.
Montazer, et al (2003) in a translation and validation study of the Iranian version of GHQ-12 studies the Mental Health of Iranians. The findings indicated that 44% of the respondents showed an indication of Mental Health problems. The findings also indicated that the shorter GHQ is remarkably robust and works as well as the longer instrument. He carried out similar studies among young adolescent and reported that the GHQ-12 is a particularly useful measure with adolescent where there are likely to be a number of different threats to their psychological health, such as poor self esteem, that may not necessarily constitute a formal psychiatric condition. In general, the findings from this study indicated that Mental Health in your people in Iran is poor and it is strongly associated with their quality of life.

Sing et al (2006) conducted a study on “Assessment of Mental Health status of middle aged female teachers of Varanasi city” The aim of the study was to assess the psychological stress work-family conflict and the Level of anxiety depression, etc. An interview schedule and two questionnaires namely adaptation of general health questionnaire (GHQ) by Goldberg D.P and Hiller V.F and a psycho social scale by Srivasta.A.K et al were simultaneously administered. The results showed that 36% of total subjects reported depressive feeling during middle age and the remaining women had irritation, frustration or anxiety. Mental Health scores highlighted those women teachers in the middle age are trapped in a situation where they are getting difficulty in coping strategies. Excess work, less freedom in work,
high need for motivation and working situations were reported as powerful source of stress among female teachers.

S. Serene Olin, Bonnie D. Kerker, Thomas R. Kratochwill et.al [2007] this review examines empirically based studies of School-based Mental Health interventions. The review identified 64 out of more than 2000 articles published between 1990 and 2006 that met methodologically rigorous criteria for inclusion. Of these 64 articles, only 24 examined both Mental Health and educational outcomes. The majority of School-based Mental Health intervention studies failed to include even rudimentary measures of School-related outcomes. Analysis of the 24 studies yielded several key findings: The types of Mental Health outcomes most frequently assessed included self-, peer-, teacher-, or parent-reported measures of social competence, aggression, or problem behaviours. Academic scores and School attendance were the types of educational outcomes most frequently assessed. The majority of interventions focused on elementary students, had a preventive focus, and targeted pro-social, aggressive, and antisocial behaviours. Only 15 of the 24 studies demonstrated a positive impact on both educational and Mental Health outcomes, 11 of which included intensive interventions targeting both parents and teachers. The studies that had an impact only on Mental Health outcomes tended to be less intensive with more limited family involvement. This review discusses
the implications of these findings for School-based Mental Health services and identifies directions for future research.

**Lydia Scott and Anna Chur-Hansen [2008]** conducted this study sought to explore the Mental Health literacy of adolescents living in a rural area in Australia through in-depth, semi-structured interviews, with a view to identifying areas for further research and making recommendations for improved education programs around Mental Health. Nine Year 10 students (two boys and seven girls) from a rural secondary School in South Australia read two vignettes, one portraying depression and the other schizophrenia. Semi-structured individual interviews that focussed on the vignettes were audio-taped, transcribed and analysed for thematic content. The data yielded a number of main themes, many of which have been previously identified in the literature. Two new findings also emerged. These were the role of Emo subculture and dealing with distress, and the value of confiding in another person through short message service (SMS) texting. The impact of Emo subculture and SMS texting on Mental Health literacy requires further exploration. It is suggested that these two findings are not confined to rural youth, but may have national and international relevance.

**Stephen Allison, et al [2008]** conducted this survey of primary, secondary and area Schools investigated their referrer satisfaction with six Child and Adolescent Mental Health Service (CAMHS) teams, spread over two metropolitan and four rural centres, and servicing six corresponding
metropolitan and rural education districts. The survey aimed to identify barriers to referral from Schools to CAMHS and to generate domains for quality improvement across the six local areas. School principals and counsellors completed the online Southern Schools Satisfaction Survey, which sought qualitative comment about aspects of the community Mental Health service in their area. The response rate (65%) was reasonably good for a large online survey, with 149 Schools participating (171 respondents: 113 principals and 58 counsellors). The majority of the respondents were satisfied with the service from CAMHS (24% were ‘very satisfied’, 47% ‘mostly satisfied’ 23% ‘mildly dissatisfied’ and 6% ‘very dissatisfied’). The main barriers and sources of dissatisfaction that Schools identified were CAMHS waiting lists, service availability and lack of flexibility. Practices from the team with the highest percentage of satisfied School respondents formed a constructive basis for service-wide quality improvement. These changes focused on flexibility in emergency responses, communication with Schools and process of care with students. Surveying referrer satisfaction can be useful for quality improvement within regional Mental Health services through the identification of good practice which can be transferred across teams.

Daniel Eisenberg et al [2009] found that mental illness stigma has been identified by national policy makers as an important barrier to help seeking for Mental Health. Using a random sample of 5,555 students from a
diverse set of 13 universities, we conducted one of the first empirical studies of the association of help-seeking behaviour with both perceived public stigma and people’s own stigmatizing attitudes (personal stigma). There were three main findings: (a) Perceived public stigma was considerably higher than personal stigma; (b) personal stigma was higher among students with any of the following characteristics: male, younger, Asian, international, more religious, or from a poor family; and (c) personal stigma was significantly and negatively associated with measures of help seeking (perceived need and use of psychotropic medication, therapy, and nonclinical sources of support), whereas perceived stigma was not significantly associated with help seeking. These findings can help inform efforts to reduce the role of stigma as a barrier to help seeking.

Meera Dhuria, et al [2009] conducted this study assess the Mental Health status and some determinants in senior secondary School children in Delhi. A cross-sectional study was carried out on a sample of 458 children, selected by 2-stage sampling. Goldberg's General Health Questionnaire containing 60 items (GHQ-60) was used for assessment of Mental Health. GHQ was administered to 239 boys and 219 girls in the age group of 15 to 20 years. Of 458 students, 113 (24.7%) had a score ≥16, the cut-off score, indicating mental morbidity among them. Among boys and girls, 28.5% and 20.5%, respectively, had some component of mental morbidity. Morbidity was significantly higher in children
hailing from nuclear families and among children who had either failed or those who had scored highest in the class. Mental Health needs of Schoolchildren need to be addressed by the School health services.

**Catherine E. Mosher and Sharon Danoff-Burg [2010]** This study examined relations among indoor tanning frequency, symptoms of depression, anxiety, and obsessive-compulsive disorder, and substance use. A total of 421 college students (68% female) completed self-report measures on one occasion. Among men, indoor tanning was positively associated with symptoms of anxiety and obsessive-compulsive disorder, whereas indoor tanning was unrelated to these symptoms among women. Among women, indoor tanning was positively associated with the use of alcohol, tobacco, and other substances. Further research is needed to explore contextual and coping processes that may underlie these gender differences.

**Christine M. S. Chan and Katherine M. Kitzmann [2010]** The aim of this study was to explore health perceptions of preschool teachers, with a view to inform early childhood practices and teacher education. Pre-service student-teachers and in-service teachers (n = 200) who were voluntarily recruited completed a 24-item health attitude questionnaire. Factor analysis identified four dimensions of health attitudes, reflecting physical, psychosocial, mental and emotional domains. Inter-correlations among the factors suggested that early childhood educators in Hong Kong embrace a holistic view of health, although they consider physical and emotional health
as more salient than the psychosocial and Mental Health dimensions. In comparisons of the perceptions of in-service teachers and student-teachers, students placed less emphasis on psychosocial health, but teachers placed more emphasis on physical health. The findings are discussed in terms of their implications for designing health education programmes for preschool teacher education.

**Katherine Weare and Melanie Nind [2011]** found that the European Union project reviewed work on Mental Health in four areas, parenting, Schools, the workplace and older people. The Schools work package carried out a systematic review of reviews of work on Mental Health in Schools from which it identified evidence-based interventions and programmes and extracted the general principles from evidence-based work. A systematic search of the literature uncovered 52 systematic reviews and meta-analyses of Mental Health in Schools. The interventions identified by the reviews had a wide range of beneficial effects on children, families and communities and on a range of Mental Health, social, emotional and educational outcomes. The effect sizes associated with most interventions were generally small to moderate in statistical terms, but large in terms of real-world impacts. The effects associated with interventions were variable and their effectiveness could not always be relied on. The characteristics of more effective interventions included: teaching skills, focusing on positive Mental Health; balancing universal and targeted approaches; starting early with the youngest
children and continuing with older ones; operating for a lengthy period of time and embedding work within a multi-modal/whole-School approach which included such features as changes to the curriculum including teaching skills and linking with academic learning, improving School ethos, teacher education, liaison with parents, parenting education, community involvement and coordinated work with outside agencies. Interventions were only effective if they were completely and accurately implemented: this applied particularly to whole-School interventions which could be ineffective if not implemented with clarity, intensity and fidelity. The implications for policy and practice around Mental Health in Schools are discussed, including the suggestion of some rebalancing of priorities and emphases.

Melissa A. Milkie and Catharine H. Warner [2011] found that Sociological research focuses on how poverty, family, and neighbourhood dynamics shape children’s problems, but knowledge about how School is related to children’s Mental Health is underdeveloped, despite its central presence in children’s lives. Using a social structure and personality-stress contagion perspective, the authors use a nationally representative sample of first graders (N = 10,700) to assess how the classroom learning environment affects children’s emotional and behaviour problems. Children in more negative environments—such as classrooms with fewer material resources and whose teachers receive less
respect from colleagues—have more learning, externalizing, interpersonal, and internalizing problems. Moreover, children in classrooms with low academic standards, excessive administrative paperwork, rowdy behaviour, and low skill level of peers have more problems across one or more outcomes. Some school effects vary across race and ethnicity.

Thilini Chanchala Agampodi, et.al., [2011] The present study was conducted to assess the prevalence and associations of Mental Health problems (MHPs) among adolescent Schoolchildren in Sri Lanka 8 months after the tsunami disaster. A descriptive cross-sectional study was carried out in the Galle Municipality area, Sri Lanka. The study instrument consisted of a self-administered questionnaire and the validated Sinhalese version of the Strengths and Difficulties Questionnaire. The prevalence of MHPs in the study population was 32.2% confidence interval, 28.44% to 35.96% direct experience of the tidal wave (odds ratio [OR = 2.93, P = .013), perception of being affected by tsunami (OR = 1.79, P = .0014), and impact of rumours (OR = 1.85, P < .001) were significantly associated with MHPs. Not having a close friend (OR = 1.79, P = .04), being criticized by teachers (OR = 1.66, P = .008), and adolescents being not satisfied with their academic achievements (OR = 2.42, P = .02) were also significantly associated with MHPs. Even 8 months after the tsunami, MHPs among adolescent Schoolchildren in the affected areas are still very high.
Akihiko Masuda, et.al., [2012] The study revealed that stigma has been noted as a major obstacle of Mental Health service use among African Americans. The present study investigated whether Mental Health stigma and self-concealment were uniquely associated with attitudes toward seeking professional psychological services in African American college students. Data of 163 African Americans were used for present analyses. Results revealed that both Mental Health stigma and self-concealment were uniquely associated with help-seeking attitudes after controlling for gender, age, and previous experience of seeking professional psychological services.

2.03 Studies Related to Scientific Aptitude

Deb (1965) conducted a study on 300 engineering students seeking admission in college of engineering and technology Jadavpur. The Test standardised in western countries were consulted. The Test consisted of 75 items; 20 minutes had been fixed as the time limit to complete the Test. After application of Spearman-brown formula the reliability of the Test becomes 89 which prove that the Test is reliable. The correlation between engineering aptitude Test and different engineering subjects shows definite relationship. Most of which having substantial relationship which proves that the Test is valid one.

Dolke and Sharma (1975) The sample of the study consisted of randomly selected 70 students studying in the School of Architecture from
third year onward classes. The mean age of the students was 21.14 yrs. The tool used was General Aptitude Test Battery (GATB) developed by the United States Department of Labour and Manpower Administration (1967, 1969). After curriculum analysis the following four aptitudes viz., general learning ability, verbal aptitude, spatial aptitude and form perception were found to be relevant with the architectural courses. GATB norms were established with multiple cut off method. The criterion distribution was dichotomized into low and high groups with the help of phi coefficients computed between trial sets of norm and the criterion. Validity and effectiveness of the norm are also reported and it was concluded that the GATB was useful in predicting success of students in the School of architecture as scores on Tests were associated with performance in the courses.

Chatterjee et al. (1978) conducted study of 115 boys reading in class X in three different Schools at Calcutta selected at random from Bengali medium higher secondary boys Schools. Their ages ranged from 15 to 17 yrs. The tools used were (1) Scientific knowledge and Aptitude Test (SKA) by Chatterjee (2) Chatterjee's non-language preference record (CNPR). The results proved that considering the score in scientific scale in CNPR along with the Scientific Aptitude score the prediction of the Achievement in Science can be significantly improved. Dabir and Pandit (1988) the sample for the study was selected from Schools in and around Nagapur. The sample
consisted of 1080 students for standards 9, 10 and 11. The occupational aspiration scale (OAS) and differential aptitude Test were administered to the sample. The result did not show that aptitudes have positive association with the vocational aspirations of the School going youth.

**Schneider et al. (1989)** studied in experiment 1 a total of 576 middle-class children from 3rd, 5th and 7th graders from rural and urban Schools. Tools used were a 13 item questionnaire was used to assess children's knowledge about soccer children's scores on the verbal aptitude component of a German cognitive ability Test feeler. Gadicks and Weinlader (1985) in experiment 2 a tool of 185 middle class children from 3rd, 5th and 7th graders. Two studies compared memory performance and text comprehension of groups that were equivalent on domain-specific knowledge but differed in overall aptitude, to investigate whether prior knowledge about a particular domain or overall aptitude Level was more important when the task was to acquire and use new information in the domain of interest. Results shows that Levels of soccer knowledge and of overall aptitude were varied in a factorial design. Neither study detected significant differences between high aptitude and low aptitude experts, regardless of their ages. Low aptitude expert outperformed high aptitude novices on all memory and comprehension measures. The results indicate that domain specific knowledge can compensate for low overall aptitude on domain related cognitive tasks.
Swanson (1990) conducted a study on children from 4 to 5 whose scores were selected from 4 elementary Schools additional information related to School aptitude was observed from the comprehension Test of Basic Skills (CTBS 1978). A sample of 25 high aptitude and 25 low aptitude children were taken. A questionnaire modified from Krcutzer et al. (1978) was used to assess metacognition in the general domain of problem solving. The important findings were that high metacognitive individual’s outperformed lower metacognitive individuals problem solving regardless of their overall aptitude Test. In fact high metacognitive knowledge/low aptitude children preformed significantly better than low metacognitive knowledge children with higher overall aptitude scores.

Brody and Benbow (1990) conducted two studies to determine (a) whether differential educational experiences contribute to differential growth on scholastic aptitude Test (SAT) scores of (b) Whether such experiences must occur over a long rather than a short duration to have impact. Specific content knowledge in mathematics/science and verbal areas taught during a short time interval did not increase SAT-M and SAT-V scores even when the content was of the type required to selves SAT problems. Exposure to academically rigorous educational experiences over a long time period (5 yrs) did relate to the development of abilities measured by SAT. In addition students who experienced very large gains on SAT over this 5 year period, in comparison with students with small gains, were achieving better in a
more rigorous program of high School courses in mathematics and science for the SAT-M and in verbal areas for the SAT-V. Results support the position that educational experiences over time influence SAT scores.

**Rothstein et al. (1994)** conducted a study on totally 450 students of 2 year MBA programme (357 men, 93 women). The sample comprised two 1st year classes (1989 and 1990) of 225 students each. All students within a section remain cohorts throughout their first year and take 9 compulsory courses taught by 9 different instructors. Tools used were personality form E of Jacksons (1984) PRF a-352 item questionnaire. Aptitude, verbal ability, quantitative ability and total GMAT percentile scores were available for each student. The result reported was (1) verbal and quantitative aptitudes make important contributions to student success in a variety of academic programs. (2) Personality variables also make important contributions to scholastic success. (3) The relative contributions of cognitive abilities and personality factors to academic success depend on the criterion of performance.

**Edna F. Einsiedel (1994)** This study addresses the question of the relationship between Scientific Aptitude and public Scientific Aptitude. General work on cognitive schemas suggests that these knowledge maps may have significant links to affect. A telephone survey of 2000 Canadian adults was conducted and included a battery of knowledge items to Test scientific cognition on basic science concepts, to examine understanding of
science processes, and to tap technological literacy. The survey also examined Scientific Aptitude and scientists. Factor analysis of the attitude items resulted in two dimensions: trust in science and feelings of efficacy on science issues. A structural equation model was applied to certain demographic antecedent variables (education, exposure to science courses, age), the scientific literacy score, and to the attitude dimensions of trust and efficacy. Findings demonstrated that scientific literacy was positively correlated with attitudes of trust and feelings of efficacy. These results were explained in terms of potential positive exposure to science in general in formal science training (in Schools) as well as to informal information sources such as the media.

Leonardo Cannavò [1997] studied the Sociological Models of Scientific Aptitude. In contemporary advanced societies, the study of science and technology has acquired huge importance; this has been possible also thanks to the sociology of science. It is a hybrid specialty, because it derives from the sociology of knowledge and the social history of science, and yet is more and more conditioned by economics and politics. This critical review article examines the opposing sociological models of science which were developed in the 20th century, and relates them to the global processes of collectivization and steady state of science and technology. The diffusion of scientific communication is suggested as an important social goal.
Bernadette C. Hayes and Vicki N. Tariq (2000) This research analysts and populist commentators have long assumed that a key factor in explaining anti-Scientific Aptitudes among women is their greater disinterest and ignorance of scientific developments. Using nationally representative Anglo-American data from the 1993 International Social Survey Programme (ISSP) Environment Survey, the results of this analysis question that assumption. Women in the United States, Canada, Great Britain and New Zealand are indeed less knowledgeable and hold less favourable Scientific Aptitude than men. However, in all but the United States, these gender differences in Scientific Aptitudes are due to male-female disparities in educational background and religious belief, not to variations in Scientific Aptitude. Thus, in Canada, Great Britain and New Zealand, it is not gender per se but rather differences in social background that explain citizens' views. A somewhat different pattern emerges in the United States. Here, it is differences in Levels of Scientific Aptitude and not demographic background, including gender, which explains public variation in Scientific Aptitude. The implications of these findings for both research analysts and policy makers are briefly discussed.

Carmen Sorge et al., (2000) This article examines the impact of a Space Science Education Program (SSEP) for students enrolled in New Mexico Math, Engineering, and Science Achievement (MESA) classes in middle Schools with a large Hispanic enrolment. An instrument was
developed to measure the Students Scientific Aptitude and scientists before and after the program. After exposure to the SSEP program, a significant and positive increase in attitudes was found. However, our study suggests that most of these students have difficulty with perceiving themselves as scientists, probably due to a lack of exposure to role models and negative media stereotypes. They also lack information on the rewards of a career in science, including opportunities in college, and they think they must be a genius at math to pursue a technical career.

**Bernadette C. Hayes (2001)** In their analysis relatively little information exists regarding gender differences in attitudes toward the environment. This is particularly the case when countries besides the United States and Canada are considered. Furthermore, the information available has proved to be inclusive, with some studies indicating that men are more concerned about the environment than women, others indicating that women are more concerned but only in relation to a narrow range of risk-related environmental issues, and still others finding no significant differences. Using nationally representative survey data from the United States, Great Britain, Norway, the Netherlands, West Germany, East Germany, and Japan, this study investigates gender differences in Levels of Scientific Aptitude and its consequences for attitudes toward general environmental issues. The results suggest that although men and women do differ in terms of their knowledge of scientific matters, this has little or no effect on their attitudes
toward the environment. Across a majority of nations, women are not more concerned about environmental issues than men and this lack of relationship holds whether or not differences in Levels of Scientific Aptitude are controlled for in the analysis.

**Rao D.B. (2010)** conducted this research study gives in detail the theoretical perspectives and research results concerned to Scientific Aptitude, Scientific Aptitude and achievement in biology. This report will help the researchers to probe into the unsorted areas, the planners to frame feasible policies, the authors to develop suitable books, the teachers to provide appropriate learning experiences, and the students to enhance the traits to the expected Levels.

**Muhammad Adele Raze (2011)** This study analyzes the impact of favourite subject towards the Scientific Aptitude of the students at elementary Level. The technique of Correlation was used for the purpose. The students having science Subjects as a favourite subject were scored 1 and students having other. Than science subjects as a favourite subject were scored 0. 1526 students (male, female, urban, rural) of multan district were considered as Sample. The coefficient correlation (r) between the Students aptitude Test score and their specific score is 0.84. Mean scores in science Aptitude Test of the students having different subjects as a favourite Subject was calculated. The mean score in science aptitude Test of Students having science subjects as a favourite subjects is 21.14 and Mean score in science
aptitude Test of students having other than Science subjects as a favourite subjects is 16.97. So, at the time of Admission in secondary classes in science education, science aptitude of the students should be seriously considered with other factors.

R.A Olatoye (2012) conducted aptitude Tests to measure Students overall performance across a broad range of mental capabilities. This study therefore investigated the role of Students verbal and numerical abilities in Students performance on aptitude Tests. Two hundred Senior Secondary School Science Students participated in the study. Three validated research instruments were used to collect data. Numerical and verbal abilities combined together to account for 38.8% of the total variance in student performance in the aptitude Test (R Square = 0.388, p<0.05). The percentage is significant. Thus, for students to perform well in the general aptitude Test, they need to have high numerical and verbal abilities. There is no significant difference between male and female Students performance in verbal ability, Numerical Ability and general aptitude Tests. This study provides an empirically based suggestion for students to develop high verbal and numerical skills in order to do well in aptitude Test. The findings from this study also imply that verbal and Numerical Ability Tests can be validated using a good aptitude Test.
2.04 Studies Related to Achievement in Science

Jha [1970] found that, (i) there was a significant positive relationship between Achievement in Science and (a) General intelligence (b) Scientific Aptitude and (c) adjustment. (ii) There was a significant negative relationship between Achievement in Science and combined sample, but not in the case of girls.

Chatterjee [1972] had investigated the effect of income, parent’s education, family size, social condition of the home upon scholastic achievement. His research findings showed no effect on the economic condition, family size and parental education upon the scholastic achievement of pupils.

Thakur [1972] found that (i) the group performance in all the branches of scholastic achievement did not differ significantly, (ii) the group performance of boys was superior to that of girls in all branches, (iii) Physics was found to be responsible for lowering the standard of science achievement and (iv) the correlation between achievement motivation and science aptitude was significant for boys only.

Vanek [1974] compared 3rd and 4th grade students using laid low science series on classification skill, science achievement and science attitudes. No achievement or classification skill differences were noted but ESS students had more favourable attitudes.
Ashmend [1976] compared the BSCS human science programmed to an existing text to see how these two approaches affected the achievement, attitudes and process skills of their students. This comparison the two approaches in affecting the factors under study.

Wards, William. H. Jr [1976] concluded that there was no evidence of direct relationship between small class size and good attitude towards science, but he suggested that class size affects attitude. There did, however, strong association exist between achievement and attitude and between achievement and class size.

Sudhir M.A & Darchhimgpu [1987] found significant sex difference in science achievement and attitude towards science among the college students and the male superiority over female in science.

Kamala, S. Pillai [1987] studied on the topic “interactive effect of science aptitude and attitude towards science in biology achievement” her study revealed that Biology achievement of secondary School pupil may differ according to the differences in science and aptitude and attitude towards science. Though earlier researchers have found that these two variables are capable of predicting success in Biology as the present study no interaction effect of science aptitude and attitude towards science. It may be possible that these variables are contributing independently to Biology achievement.
Sundararajan and Andal [1989] also have reported that there was statistically significant difference between boys and girls in their academic achievement that sex wise difference was more or less absent in the achievement of boys and girls in commerce and science faculties.

Laura S. Hamilton, et.al [1995] study is second in a series demonstrating that achievement Tests are multidimensional and that using psychologically meaningful sub scores in national educational surveys can enhance Test validity and usefulness. NELS:88 8th- and 10th-grade science Tests were subjected to full information item factor analysis. Factors reflecting everyday knowledge, scientific reasoning, chemistry knowledge, and reasoning with knowledge were obtained in 8th grade. Quantitative science, spatial-mechanical, and basic knowledge and reasoning were distinguishable factors in 10th grade. Regression analyses showed that different patterns of prior math and science achievement, and of course taking, were associated with each 10th-grade science factor. Teacher emphasis on problem solving and understanding related more to quantitative science, and basic knowledge and reasoning. Spatial-mechanical reasoning showed the strongest gender and ethnicity effects; it related also to science museum visits but not to instructional variables. It is recommended that multidimensional achievement scores be used to capture student and teacher effects that total scores used alone miss.
Ambigapathi [1997] found that, sex and age are the influencing factor for the achievement. Localith and parents income Levels have do not show any influence on achievement. There exist a significant difference between students studying in welfare Schools and other Schools in respect of their achievement in Biology & Zoology. Hence, type of management is an influential factor for their achievement and self concept.

Rajasekar [1997] In his study on higher secondary students achievement in physics as related to certain variables revealed that

1. There is no significant difference between boys and girls in respect of their achievement in Physics.
2. There is a significant difference between urban and rural students secure more marks than rural students.
3. There is a significant difference between Government and Private students. Govt. School students perform better than Private School students.

Laura S. Hamilton [1998] has investigated gender differences on the NELS: 88 multiple-choice and constructed-response science Tests were explored through a combination of statistical analyses and interviews. Performance gaps between males and females varied across formats (multiple-choice versus constructed-response)and across items within a format. Differences were largest for items that involved visual content and
called on application of knowledge commonly acquired through extracurricular activities. Large-scale surveys such as NELS: 88 are widely used by researchers to study the effects of various student and School characteristics on achievement. The results of this investigation reveal the value of studying the validity of the outcome measure and suggest that conclusions about group differences and about correlates of achievement depend heavily on specific features of the items that make up the Test.

Joachim Sieglen and Günter Trost [1998] found that the Institute for Test Development and Talent Research is conducting a longitudinal study which started in 1973 on a nationally representative sample of 9000 persons who then graduated from upper secondary School and were followed up ever since at five-to-six-year intervals. Out of this sample and, in addition, out of the former scholars of the most selective German national scholarship program, 40 persons were identified who had, by their mid-thirties and later on, achieved outstanding and influential research results in the natural sciences. This group was compared with the total representative group in terms of a number of potential predictor variables. The most distinctive features were: The outstanding scientists had achieved much higher performance both in School and in university. They pursued to a higher extent curricular and extracurricular interests in the areas of natural sciences and mathematics during adolescence. They were much more inclined to tackle intellectual problems (and did so more successfully), and
they participated more frequently in academic competitions. They had and have a much higher professional motivation: their career decisions were more heavily based on intrinsic and achievement-oriented motives, and the average time per week they devote to their work is considerably higher.

**Okhee Lee [1999]** found that the construct of science achievement—what K-12 students should know and be able to do in science—is central to science education reform. This paper analyzes current conceptions of science achievement in major reform documents, and considers equity implications for science achievement and assessment in the context of standards-based and systemic reform. The paper reviews documents on science content standards (NSES and Project 2061), performance standards (New Standards), and large-scale assessment frameworks (1996 NAEP and TIMSS). Although the documents emphasize equity as the key principle, they present the assimilations perspective by defining science and science achievement in terms of the Western science tradition with little consideration of alternative views of science and ways of knowing from diverse backgrounds. Based on the conception of equity in terms of social justice, the paper proposes the cultural anthropological perspective to develop a more inclusive and broader view of science achievement and assessment for diverse students.

**Ralph B. McNeal, Jr. [1999]** found that using the concepts of cultural and social capital provide a theoretical framework for why there
should be differential effects of parental involvement across cognitive (e.g., science achievement) and behavioural (e.g., truancy and dropping out) outcomes. Findings indicate that parental involvement is generally a salient factor in explaining behavioural but not cognitive outcomes, with greatest support for parent-child discussion and involvement in parent-teacher organizations. Findings also indicate that specific dimensions of involvement have greater effects for more affluent and white students, providing empirical evidence to support Lareau's (1989) contention that the greater levels of cultural capital possessed by members of the upper class magnify parental involvement's effect for advantaged students. The theoretical framework and associated findings provide insight into the seemingly inconsistent findings revealed in much previous research on parent involvement and achievement.

**Patricia A. Muller, et.al. [2001]** Using hierarchical linear modelling (HLM) and longitudinal data from the first three waves of the National Education Longitudinal Study (NELS: 88), they examined achievement and growth rates in precollege science by racial-ethnic and gender subgroups. They found socioeconomic status and previous grades strongly and positively related to Students eighth-grade achievement across all racial-ethnic by gender subgroups. They also found locus-of-control to be strongly related to eighth-grade science achievement for all subgroups except Asian American males. In modelling the growth rate, they found that the
quantity of science units completed in high school was the only consistent predictor of science growth rates across all racial–ethnic by gender subgroups. The relationships between individual-Level factors and science growth rates differed greatly for the remaining individual-Level variables, highlighting the need for further research that both disaggregate data by race–ethnicity and gender.

Xin Ma and Jesse L. M. Wilkins [2002] found that using data from the Longitudinal Study of American Youth (LSAY), hierarchical linear models (HLMs) were used to model the growth of student science achievement in three areas (biology, physical science, and environmental science) during middle and high school. Results showed significant growth in science achievement across all areas. The growth was quadratic across all areas, with rapid growth at the beginning grades of middle school but slow growth at the ending grades of high school. At the student level, socioeconomic status (SES) and age were related to the rate of growth in all areas. There were no gender differences in the rate of growth in any of the three areas. At the school level, variables associated with school context (School mean SES and School size) and variables associated with school climate (principal leadership, academic expectation, and teacher autonomy) were related to the growth in science achievement. Initial (Grade 7) status in science achievement was not associated with the rate of growth in science achievement among either students or schools in any of the three areas.
Peter Teitelbaum [2003] found that one of the most widely implemented educational reform efforts of the last two decades has been the adoption of increased high School graduation requirements, especially in mathematics and science. The present study examines the effect of that reform. More particularly, this article first investigates the extent to which a commonly adopted requirement that students complete three credits in mathematics and science was implemented at Schools. Using multilevel regression analysis, the study then examines the relationship between three-course requirements in mathematics and science and three expected outcomes: increases in the number of credits students earned in mathematics and science, increases in the Level of mathematics and science classes completed by students, and increases in student achievement in math and science, as measured by 8th- to 12th-grade Test score gains. To Test this relationship, the author drew a nationally representative sample of 1992 public high School graduates from the National Educational Longitudinal Study conducted in 1988. Analysis of these data indicates that many Schools that required students to complete three courses in math or science in order to graduate did not strictly enforce this policy, allowing a substantial percentage of the students to graduate without earning three credits in these subjects. Nevertheless, three-course requirements influenced students to earn more credits in mathematics and science; however, only some students completed this additional coursework in advanced classes. In addition,
student Test score gains did not vary by high School graduation requirement policy. These findings suggest that increasing the number of credits students have to earn in mathematics and science to graduate from high School by itself may not be sufficient to improve student proficiency in these subjects.

*Xin Ma and Lingling Ma [2004]* in their study introduced a multivariate multilevel model to estimate the consistency among students and School in the rates of growth between mathematics and science achievement during the entire middle and high School years with data from the Longitudinal Study of American Youth (LASY). There was no evident consistency in the rates of growth between mathematics and science achievement among students, and this inconsistency was not much influenced by student characteristics and School characteristics. However, there was evident consistency in the average rates of growth between mathematics and science achievement among Schools, and this consistency was influenced by student characteristics and School characteristics. Major School-Level variables associated with parental involvement did not show any significant impacts on consistency among either students or Schools. Results call for educational policies that promote collaboration between mathematics and science departments or teachers.

*Adelaide Pigg and Tina M. Waliczek [2004]* found that science and math achievement scores of 3rd, 4th, and 5th grade elementary students were studied using a sample of 196 students from McAuliffe Elementary School,
located in McAllen, Texas. Students in the experimental group participated in the Junior Master Gardener program in addition to the traditional classroom-based math and science methods. In contrast, students within the control group were taught math and science using only traditional classroom-based methods. No statistically significant differences were found in comparisons of science Students achievement scores, indicating that those students using the Junior Master Gardener program as a method to learn science benefited similarly to those who learned using only traditional science classroom-based instruction. However, results indicated statistically significant differences in comparisons of Students math achievement scores showing that those students who received traditional math instruction had more improved math achievement scores compared to those taught using the Junior Master Gardener program. Results also found no statistically significant differences between demographic groups indicating that males and females and students from different ethnicities benefited similarly from participation in the Junior Master Gardener program.

**C.D. Klemmer, et.al. [2005]** in their study revealed that science achievement of third, fourth and fifth grade elementary students were studied using a sample of 647 students from seven elementary Schools in Temple, Texas. Students in the experimental group participated in School gardening activities as part of their science curriculum in addition to using traditional classroom-based methods. In contrast, students in the control group were
taught science using traditional classroom-based methods only. Students in the experimental group scored significantly higher on the science achievement Test compared to the students in the control group. No statistical significance was found between girls and boys in the experimental group, indicating that gardening was equally effective at teaching science for both genders. After separating the data into the grade Levels, the garden curriculum was more effective as a teaching method in raising science achievement scores for boys in third and fifth grades, and for girls in the fifth grade compared to traditional classroom-based methods alone.

C.D. Klemmer, et. al., [2005] found that School gardens show promise as a tool for developing science process skills through real-world investigations. However, little research data exist at Testing to their actual effectiveness in enhancing Students science achievement. The purpose of this study was to develop three cognitive Test instruments for assessing science achievement gain of third, fourth and fifth grade students using a garden curriculum. The development of the Test instruments occurred in three phases: 1) an initial set of Test instruments which served as a prototype for length, scope, and format; 2) an adapted set of Test instruments which were piloted; and 3) a final set of Test instruments which were used for the assessment of the School gardening curriculum. The final Cronbach's alpha reliability for the final set of Test questions was 0.82, indicating an acceptable Level of internal consistency. Content validity of the Test
instruments developed for this study was established based on the science content standards specified in the Texas Essential Knowledge and Skills (TEKS) for each grade Level along with the gardening curriculum, as well as the Science Scope and Sequence documents for Temple, Texas Independent School District (ISD). Construct validity was established for the Testing instruments by soliciting help from various curriculum experts from the Temple ISD.

Gautam Puhan and Mark J. Gierl [2006] evaluated the effectiveness of two-stage Testing on English and French versions of a science achievement Test administered to a national sample in Canada in 1996 and 1999. The Tests were administered and scored with the implicit assumption that the two language forms were equivalent. Analysis of the first-stage Test revealed that 3 out of 12 items displayed differential item functioning (DIF) in both administrations. However, substantive reviews suggested that translation errors were not the cause of DIF. Analysis of the second-stage Test revealed that the Test was not comparable between ability groups but was comparable for English and French examinees within each ability group in both administrations. This study illustrates how Test developers can monitor their adaptation and administration process when alternative Testing procedures are used with multiple language groups. The results are also relevant to cross-cultural researchers who compare examinees from different ethnic and cultural backgrounds.
Tenaha O’Reilly and Danielle S. McNamara [2007] examined how well cognitive abilities predict high school students’ science achievement as measured by traditional content-based Tests. Students (n = 1,651) from four high Schools in three states were assessed on their science knowledge, reading skill, and reading strategy knowledge. The dependent variable, content-based science achievement, was measured in terms of Students comprehension of a science passage, science course grade, and state science Test scores. The cognitive variables reliably predicted all three measures of science achievement, and there were also significant gender differences. Reading skill helped the learner compensate for deficits in science knowledge for most measures of achievement and had a larger effect on achievement scores for higher knowledge than lower knowledge students. Implications for pedagogy and science assessment are discussed.

Qing Yi, et.al. [2008] have investigated the group invariance of equating results using a science achievement Test. Examinees were divided into different subgroups based on the average composite score for Test centres, whether they had taken a physics course, and self-reported science grade point average. The reason for dividing examinees into subgroups using such variables is that those variables are more related to performance on a science achievement Test than, say, gender. Results indicated that the conversions obtained from different subgroups were similar to the conversions obtained by using the total group, except when the groups were
divided based on whether a student had taken a physics course. Where there were differences, the differences were generally equated raw score point.

**Vi-Nhuan Le, et. al., [2009]** conducted a study in which several major initiatives were launched to improve mathematics and science education. One prominent feature in these efforts was a new approach to teaching mathematics and science, referred to as reform-oriented teaching. Although past studies suggest this approach may improve student achievement, the relationships between reform-oriented pedagogy and achievement were weak. The weak relationships may be partially attributable to the limited time frame in which reform-oriented teaching was examined (typically a one year period). This study explored the relationship between mathematics and science achievement and reform-oriented teaching over a three years period. Results suggested greater exposure to reform-oriented instruction was generally not significantly associated with higher student achievement but the effects became stronger with prolonged exposure to reform-oriented practices. Reform-oriented instruction showed stronger, positive relationships with open-ended measures than with multiple-choice Tests in both mathematics and science and with problem-solving skills than with procedural skill mathematics.

**Brian A. Nosek, et.al., [2009]** found that about 70% of more than half a million Implicit Association Tests completed by citizens of 34 countries revealed expected implicit stereotypes associating science with
males more than with females. We discovered that nation-Level implicit stereotypes predicted nation-Level sex differences in 8th-grade science and mathematics achievement. Self-reported stereotypes did not provide additional predictive validity of the achievement gap. We suggest that implicit stereotypes and sex differences in science participation and performance are mutually reinforcing, contributing to the persistent gender gap in science engagement.

**Jane Beese and Xin Liang [2010]** found that the PISA 2006 Science Literacy Assessment results report Finland as the first ranked country out of the 30 developed nations that participated in the Testing (Organization for Economic Cooperation and Development, 2007). The United States was ranked 21st. Closer examination of School and student variables may help explain these outcomes. This article will use the PISA 2006 data to investigate how School resource indicators such as teacher qualifications, School resources, and School type, as well as student Level indicators such as socioeconomic status and family resources affect science achievement. Comparisons will include the United States, Canada, and Finland. Due to the differences in the structure of educational systems and the makeup of student populations, findings have given an inaccurate impression that international competitiveness in science is not a viable option for the US (Ginsburg, Leinwand, & Pollock, 2007). Findings indicate School funding practices; teacher quality, School type, and family socioeconomic status impact
student science achievement and have an effect on international School rankings.

Akira Miyake, et. al., [2010] studied that in many science, technology, engineering, and mathematics disciplines, women are outperformed by men in Test scores, jeopardizing their success in science-oriented courses and careers. The current study Tested the effectiveness of a psychological intervention, called values affirmation, in reducing the gender achievement gap in a college-Level introductory physics class. In this randomized double-blind study, 399 students either wrote about their most important values or not, twice at the beginning of the 15-week course. Values affirmation reduced the male-female performance and learning difference substantially and elevated women's modal grades from the C to B range. Benefits were strongest for women who tended to endorse the stereotype that men do better than women in physics. A brief psychological intervention may be a promising way to address the gender gap in science performance and learning.

Eric D. Deemer, et.al. [2010] found that the current research sought to extend the 2 x 2 achievement goal framework by developing and Testing the Achievement Goals for Research Scale (AGRS). Participants (N = 317) consisted of graduate students in the life, physical, and behavioural sciences. A principal components analysis (PCA) extracted five components accounting for 72.59% of the variance in the data.
Additional confirmatory factor analytic testing yielded support for a 6-factor model in which the performance factor was bifurcated into approach and avoidance components. The final solution comprised the following 6 subscales: (a) absolute task mastery goals; (b) incremental task mastery goals; (c) mastery avoidance goals; (d) performance approach goals; (e) performance avoidance goals; and (f) self-demonstration of competence goals. The 6-factor model was found to outperform alternative 5-, 3-, and 2-factor models. Preliminary evidence of convergent and discriminant validity was evidenced by way of relations with measures of academic achievement motivation, behavioural inhibition/activation sensitivity, fear of failure, self-handicapping, and decisional procrastination. Future research directions and implications for career assessment and achievement goal theory are discussed.

**Andreas J. Stylianides and Gabriel J. Stylianides [2011]** Research showed that children’s School-entry academic skills are strong predictors of their later achievement, thereby highlighting the importance of children’s achievement at kindergarten entry. This article defines a particular type of parental involvement in children’s education and uses a representative sample of American urban kindergarteners to examine its effect on urban children’s mathematics, reading, science, and social studies achievement at kindergarten entry. The findings in this article are isomorphic in the different subject areas and show that children with more access to
this particular type of parental involvement tend to have higher academic achievement than their peers.

### 2.05 Achievement in Science and Mental Health

**Robert Roeser et. Al (1999)** in their study entitled “Academic functioning and Mental Health in adolescence patterns progressions and routes from, childhood”, found that among the three groups namely poor motivation, poor Mental Health well adjusted groups, youth in the poor motivation and poor Mental Health groups were in the middle and were not different from one another on achievement and you in well adjusted groups reclines higher grades than each of the other groups. Therefore they found that there is a relationship between Mental Health and achievement.

**Steven L. Gortmaker, et.al (2010)** studied that the effects of television viewing on mental abilities have shown mixed results, but most suffered from one or more of the following shortcomings: a small or otherwise unrepresentative sample, a cross-sectional rather than longitudinal approach, and a failure to consider intervening variables between television viewing and cognitive skills. This study was designed to overcome these deficiencies by using nationally representative data from the National Health Examination Cycle 2 and Cycle 3 Surveys. These surveys included 1,745 children who were studies both when 6 to 11 years old (between July, 1963, and December, 1965) and about four years later when
12 to 17 years old (between March, 1966, and March, 1970). Simple analysis at just one time-point reveals substantial relationships between the amount of television viewing and depressed IQ and Wide Range Achievement Test (Reading and Arithmetic) scores of adolescents. When longitudinal controls are added, however, these relationships become statistically insignificant and substantively unimportant. Although these data are 20 years old, they indicate no significant causal relationship between the amount of television viewed and the mental aptitude and achievement Test scores of adolescents, thus supporting and extending Gaddy's (1986) recent longitudinal study of a national sample of youth.

E Raquiba J Khan, Karen Bedford and Mandy Williams [2012] evaluated the scheme qualitatively through face-to-face interviews with a representative from each School and thematic analysis of the information. Participants believed that external support is needed to run additional programmes, as Schools have competing priorities. They understood the link between the well-being of students and staff and good Mental Health. The achievements identified included less bullying and more student participation, connectedness, networking with outside agencies and increased confidence in showcasing their programmes. The challenges included: engaging culturally and linguistically diverse and indigenous communities; resources; support from the School executive; and staff transitions, time, skills and motivation. Factors that enabled Schools to
achieve positive outcomes were: partnership with the health service; Mind Matters training; a positive staff attitude; and support from within the School.

2.06 Achievement in Science and Scientific Aptitude

Dey and Sinha (1968) conducted a study on 90 students studying in class VIII of a higher secondary multipurpose School of Bihar with science as their elective subject, served as subjects, tools used were (1) The Bihar Test of general intelligence std. by Bihar Bureau of educational and vocational guidance (2) the science aptitude Test (3) The objective achievement Tests of physics and chemistry constructed by the same agency for class VIII of the Schools of Bihar. The result showed that (1) intelligence was significantly correlated with examination marks (Science average) of the subjects of classes VIII and IX but its correlation with science average marks of subjects of class X though positive was not significant. (2) The science aptitude Test had significant correlation with science average marks of students of class IX only. It had positive but insignificant correlation with the marks of the same students in class X and very low correlation with marks obtained in class VIII (3) the objective achievement Tests of physics and chemistry had insignificant correlation with the marks obtained in science by the subjects in all the three classes.
**Wray and Alexakos (1969)** studied two types of factor analysis of study 21 measurements, 9 of aptitude and 12 of achievement. Sample size was 122 high School seniors. Results indicated that most aptitude variable could be considered distinct entities while most achievement variables clustered around a general achievement factor.

**Agarwal (1977)** conducted a study on a sample of 1073 boys and 354 girls drawn from 23 institutions representing all the educational regions of UP. The sample was purposive. Tools used in this study were (1) verbal group Test of intelligence (BPT-14) (2) Revised Minnesota paper form board (3) Reasoning Test (4) Science Information Test (5) Science Vocabulary Test (6) Numerical Ability Test. The study concludes that, the battery is effective and can safely be used for predicting success in science courses. The battery can be employed for the relation of students for science courses in Class XI those, who desire to opt for mathematics in class XI, can be screened with the help of the battery of Tests. 2.1.3 Influence of aptitude on academic achievement of the students.

**Burns (1980)** examined one possible reason for the lack of consistent findings in aptitude. Treatment interaction research namely the instability of aptitude. Learning relations overtime. Four classes of predominantly 10th grade students were taught an imaginary science over a 4 day period. Achievement measures were obtained each day. Students completed 14 aptitude measures prior to instruction and 5 additional aptitude scores were
obtained from student records. Component scores from a derived principal. Components solution to the inter correlations of the aptitude scores were then correlated with each of the achievement scores. The results indicated that some aptitude achievement relations were not stable over time and that this instability was exhibited in different aptitudes being required at different points in time during instruction.

**Pillai (1990)** conducted a study on the sample of 800 students studying in standard IX of 20 secondary Schools in Kerala. The tools used were (1) Achievement Test in biology developed by Ayishabi and Sulatha (2) Kerala university science aptitude Test std. by Nair and Ramanandan (3) Scale of attitude towards science developed by Anand and Pillai, F value for factor science aptitude is significant at 0.01 Level indicating that the pupils of three different Levels of science aptitude performed differently in biology achievement Test. Similarly for factor attitude towards science also the F value is significant. The study reveals that biology achievement of secondary pupils may differ according to the differences in science aptitude or attitude towards science as the present study shows no interaction effect of science aptitude and attitude towards science. It may be possible that these two variables are contributing independently on biology achievement.

**Rao (1995)** conducted a study on a comparative study of scientific attitude, Scientific Aptitude and achievement in biology at secondary School Level. The total sample of 600 students studying in 10th class in secondary
Schools of Guntur district. Andhra Pradesh was included age Level of the students was 14 or 15 years. The tools used were scientific attitude scale of JK Sood and R.P. Sandhya and Kerala University science aptitude Test of Nair et al. The marks in biology scored in the pre-public examination of the tenth class of the district were taken in to consideration to assess the achievement of pupils in biology. The study revealed that the association among scientific attitude, Scientific Aptitude and biology achievement was highly significant and positive.

**Timothy R. Konold et.al [1997]** developed normative core profile taxonomy of the most common aptitude and achievement scales in the Woodcock-Johnson Psycho-Educational Battery-Revised (WJ-R; Woodcock & Johnson, 1989). Eight scales were included in the analyses: the WJ-R's four scholastic aptitudes and their four corresponding achievement scales. Cluster analysis was used to sort 2,620 students from the standardization sample of the WJ-R. Results of internal and external validity analyses provided support for eight core profiles. Both theoretical and practical implications are discussed in terms of how the ability and achievement scores cover in the population. Practical implications and utility are gained by providing a multivariate procedure through which the distinctiveness of a given child's aptitude-achievement profile can be accessed through comparison to the population core types.
Rao D.B. (2010) This study gives in detail the theoretical perspectives and research results concerned to Scientific Aptitude, Scientific Aptitude and achievement in biology. This report will help the researchers to probe into the unsorted areas, the planners to frame feasible policies, the authors to develop suitable books, the teachers to provide appropriate earning experiences, and the students to enhance the traits to the expected Levels.