## CHAPTER - II : REVIEW OF LITERATURE

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This chapter contains the review of related studies with regard to Divergent thinking, Convergent thinking and Mental ability of sighted children as well as visually impaired children. Such a review will help the researcher to develop better insight into the nature of the problem and the type of variables the researcher may have to deal with.

Many studies have been conducted in India and abroad on the different aspects of Divergent thinking, Convergent thinking of sighted children and visually impaired children. The studies have been presented under the following headings.

2.1 Studies Conducted in India

2.1.1 Studies on Divergent Thinking and Convergent Thinking of Normally Sighted

2.1.2 Studies on Mental Abilities of School Children

2.1.3 Studies on Visually Impaired Children

2.2 Studies Conducted in Abroad
2.2.1 Studies on Visually Impaired Children.

2.2.2 Studies on onset of Blindness.

2.2.3 Studies on Body Awareness of Visually Impaired Children

2.2.4 Studies on Object/Situation Characteristics

2.2.5 Studies on Spatial Awareness of Visually Impaired

2.2.6 Skills and Activity Oriented Concepts

2.2.7 Studies on Related to Measurements

2.2.8 Studies on Orientation of Environment and Mobility.

2.2.9 Studies on Behaviour and Learning of Visually Impaired Children

2.3 An Overview of the Research Reviewed

2.1 Studies Conducted in India

Various studies have been conducted on the convergent thinking, divergent thinking and mental ability of sighted individuals. But, studies on psycho educational aspects of visually impaired have hardly been conducted in India. The studies conducted in India are here under.

2.1.1 Studies on Divergent Thinking and Convergent Thinking of Normally Sighted Children

The first research in the area of divergent thinking submitted for a formal degree of the University of Calcutta was done by Manas Ray Chaudhuri (1963). This clinically-oriented investigation attempted to lay bare the differential, psychological, social, environmental and developmental variables that characterise creative talent in music. A recent analysis (Bhaskara, 1987) of the 24 studies abstracted in the two previous Surveys of Research in Education (Buch, 1983 and 1987) indicated that the 24 studies could be classified as (i) Test
construction and related researches - 9, (ii) Correlational studies and related researches - 13, and (iii) intervention studies of fostering creativity - 2. However, it seems that researches have not been prolific and much has not yet been accomplished in terms of quality and quantity when compared to international contributions. The following table lists the universities which have awarded more than five Ph.Ds in the area of Divergent thinking.

Universities which Awarded more than Five Ph.Ds in the area of Divergent thinking

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<th>Universities</th>
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<td>Agra University</td>
<td>19</td>
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<tr>
<td>Avadh University</td>
<td>7</td>
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<tr>
<td>Meerut University</td>
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<tr>
<td>M.S.University</td>
<td>9</td>
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<tr>
<td>Punjab University</td>
<td>7</td>
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<tr>
<td>Kerala University</td>
<td>9</td>
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<tr>
<td>Kurukshetra University</td>
<td>8</td>
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<tr>
<td>Delhi University</td>
<td>7</td>
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<td><strong>Total</strong></td>
<td><strong>74</strong></td>
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Interestingly, most of the studies have used secondary and higher secondary students as their subjects. However, various aspects of doctoral and other researches on creativity warrant a close look.

Malhotra, S.P. and Rita Chopra (1985) studied the effectiveness of brainstorming on development of creative thinking. A sample of twenty students was selected in the age group from 14+ to 16+, 10 for experimental and 10 for control group. The finding was that the Brain storming helps in developing originality, flexibility and fluency amongst students.

Deepika Sharma and Sansanwal, D.N (1993) studied the effectiveness of the instructional material for developing creativity of class VII
students. This study was experimental in nature. A total of 110 students were selected from standard VII. The sample was divided into two groups. Some of the students were absent at the time of testing. Therefore, 51 belonged to the flexible time group, and 35 students belonged to the fixed time group. Age range of the sample was 12-14 years.

The Beqer Medhi (1973) Verbal and Non-verbal Creativity Test was used with instructional material developed by the investigator. Pre-test and Post-test were conducted to study the effectiveness of the instructional material. The developed instructional material was found to be effective in terms of verbal and non-verbal creativity of students with fixed time and flexible time.

Gupta, S.M. and Ramachandrada (1994) studied the relationship between intelligence and creativity with regard to demographic variables like sex, locality, and socio-economic status (SES). 150 Postgraduate students (75 boys and 75 girls) from 8 different departments were selected by using stratified random sampling technique. Wallah-Kogan Test of Creativity, Group Test of Mental Ability (Jalotra and Tandon) and Socio-Economic Status (SES) Scale by Padhi were used as tools for this study. Two-way ANOVA, Three-way ANOVA and Product Moment correlation were applied for the analysis of data. He found that (i) high intelligent students are more creative than low intelligent students, (ii) sex and intelligence are independent as far as creativity is concerned, (iii) No significant difference between urban and rural students in creativity, (iv) socio-economic status does not differ significantly on creativity, (v) creativity is significantly and positively correlated to intelligence.

Gurpal Singh Jarial (1982) studied six hundred secondary school students of different birth orders for creativity employing Passi’s Tests of Creativity. The first born scored higher on different creativity variables as
compared to their counterparts of other birth orders. So he concluded that the birth order of the subjects caused major difference in their creativity performance.

Ramlingam, Balakrishnan and Vedagiri Ganesan (1980) made study on creativity and job-satisfaction. The sample for this study consisted of 110 blue-collar workers (machine operators, maintenance fitters, carpenters, and helpers) from two factories at Madras. To measure the creativity of the subject, Wallach and Kogan creativity Tests (1965) were used. Job-satisfaction of the subjects was measured by using Wenimont's job-satisfaction scale (1966). The result revealed that the high, moderate and low creatives do not differ significantly in their levels of job-satisfaction with regard to each of the five motivators and five hygienes, as all the F ratios were not significant. This reveals the fact that the creativity of these blue-collar workers has no effect on their job-satisfaction.

Santhanakrishnan S. and Andal Ramalingam (1990) attempted to study the relationship between Demographic variables and creativity. In their study, 91 Xth Standard boys and girls drawn from Higher Secondary School of Pondichery town were considered as sample. Bacquer Medhi's Verbal Creativity Test was used for measuring creativity of the subject. The results from this study shows that (1) There is no sex influence on creativity. There is no male domination or female inferiority as far as creativity is concerned. Creativity is equally spread out in both boys and girls. (2) Age as a variable does not affect creativity. (3) The birth-order has influence on creativity. Among the four birth-orders included in this study, the last born are the most creative.

Sansanwal, D.N. and Gurpal Jariah (1983) conducted a study on relationship between creativity and intelligence in the contrast of academic
subjects among high school students. Measurement of intelligence was made through the use of Prayag Mehta's Test of Verbal Intelligence. The scores on fluency, flexibility, originality and total creativity were obtained by administering Passi's Test of Creativity (Verbal Form). The sample consisted of 60 male students of Class IX from the city of Indore. Out of these 30 were from Science stream and 30 from Commerce stream. The students were assigned to high and low intelligence categories on the basis of mean intelligence scores obtained by them. The study however indicated no significant difference either between the high and low creativity groups or between Science and Commerce group. No significant interaction could be noticed between intelligence and academic subjects on creativity.

Sharma, S.D (1982) conducted a study to know the effectiveness of giving Brain storming sessions on Divergent thinking of high achievers in science subject. He considered 32 high achievers in science from a high school as sample for his study. They were formed into two equivalent groups on the basis of their scores in Dutt's Scientific Creativity Test Form A. An Experimental study was conducted. The experimental group was given treatment by providing divergent thinking situations through Brain storming for about 20 minutes per day after school hours. This treatment continued for 15 days. At the end, the Dutt's Scientific Creativity Test Form - B was administered to both the groups. He found that the treatment group acquired significant changes in the mean score of the groups.

Sumangala, V and Mini Mathai's (1993) study intended to see whether socially advantaged group and socially disadvantaged group differs significantly
in their creativity - verbal, figural, symbolic and total creativity - when socio-economic status, caste, family size and locale were taken as criterion variables. A Comprehensive Test of Creativity for Secondary School Pupils was used to gather creativity score. Kerala Socio-Economic Status Scale was used to collect socio-economic information from 700 students of Standard IX drawn by the Stratified random sampling method. They found that socially advantaged and socially disadvantaged groups of students performed alike in verbal creativity and figural creativity. Whereas in symbolic creativity, these two groups of students differ significantly.

Sumangala, V. (1988) attempted to identify and compare the psychological factors with high and low creative pupils. Psychological variables viz., ability, adjustmental, temperamental, motivational, attitudinal and anxiety were studied. The other variables were (i) verbal intelligence, (ii) non-verbal intelligence, (iii) Personal adjustment, (iv) social adjustment, (v) masculinity, femininity, (vi) introversion-extroversion, (vii) self-concept, (viii) achievement motivation, (ix) attitude towards academic work, (x) examination anxiety and (xi) general anxiety.

262 secondary school pupils (107 boys and 155 girls) were taken as sample. The test used for measuring creativity was Kerala tests of all aspects (viz., Kerala Verbal Test of Creativity (Nair and Sumangala, 1978). Pearson's product movement coefficient of correlation and factor analysis was calculated. The result was that the association between creativity and the different psychological variables vary from group to group.

Geeta Chenbey (1989) attempted to study the correlation between creativity and self-concept. A total of 100 B.Sc. students were selected as
sample Verbal Test of Creativity by Beqer Mehdi was used for measuring creativity. Bhatnagar's Test was used for obtaining self-concept score. The result was that creativity has a positive correlation to self-confidence, withdrawing tendencies, and emotional instability.

Sunil Dutt (1988) attempted to study the relationship between creativity and achievement and Socio Economic Status (SES) of secondary students. Torrence Test of Creative Thinking (TTCT) Verbal Form A, Srivastava SESS (Urban) and Achievement Test developed by the investigator were used as tools. A total of 150 students were taken by random sampling method. The major findings were (i) total verbal creativity had no relation with SES, (ii) SES did not affect achievement in science.

Venkata Rami Reddy and Balakrishna Reddy (1983) made a study on the Correlation between creativity and intelligence. They prepared a Creativity Test consisting of 10 sub-tests and used Raven's Progressive Matrices to measure creativity and intelligence, respectively. They selected 90 students by multi-stage stratified random sampling procedure. The sample of students were equally distributed between the three grades (VIII, IX, and X), the three localities (urban, semi-urban, and rural), and the two sexes. The sample of students was administered a creativity test battery and a mental ability test.

The correlation coefficient between Creativity Test Scores and Mental Ability Scores was calculated. The correlation coefficients ranged from 0.16 to 0.54 for fluency, from 0.13 to 0.53 for flexibility, and from 0.17 to 0.53 for originality for the different sub-tests. When the composite score was calculated by adding the score on the three components, the correlation between the composite score and mental ability ranged between 0.16 to 0.54 for different sub-tests.
These correlation indicates that there is significant correlation between creativity and intelligence. To probe into the nature of correlation between creativity and intelligence in the case of students having high level of IQ, they chose a sub-group of the sample, consisting of students who scored more than 40 on the RPM (Above the 50th percentile). The creativity test scores of this selected group were correlated to their score on the RPM. They observed that all the coefficients of correlations were negative and ranged between -0.01 to -0.43. But most of the correlation were not significant.

Venkateswaran (1987) studied the relationship between Creativity and academic achievement. The main objective of his study was to compare high achievers and low-achievers, male and female students with regard to creativity. 100 students of 11th and 12th standard were selected as sample from a school at Madurai. A questionnaire titled "How creatively you are" by Engene Randsep of the Princeton Centre of Creativity Research was used as tool. He found (i) High achievers and low achievers do not differ significantly in creativity, (ii) There is no significant sex difference in creativity, (iii) male high achievers and low achievers do not significantly differ in creativity, (iv) Female high achievers and low achievers do not differ significantly in creativity, (v) male low achievers and female low achievers do not differ significantly in the creativity, (vi) The male high achievers and female high achievers do not differ significantly in the creativity. Conclusion is that the negative correlation between the academic achievement and creativity may be due to the system of examination which focuses only on convergent thinking (as such creativity requires divergent thinking)

Lindseth and Virginia Mac Donald (1976) conducted a study to relate creativity in the private, secular school to the type of setting (co-ed, single sex)
and value orientations of the students. The sample consisted of 298 students from four schools. Eighty six students attended single-sex girls schools and sixty eight attended a single-sex boys schools. The three instruments used were the Creativity Score from (Form - U) Biographical Inventory, the Creative Perception Index Form and Alport Vernon Lindzey Test of Values. Fifty nine students were defined as high creative and fifty nine as low creative.

The study indicated no significant relationship between sex and either high or low creative. Multipurpose regression analysis used in both creativity measures, showed that the economic, theoretical and the aesthetic value scores accounted for 11 percent of the creativity score, the economic score showing a negative correlation. They concluded that value preferences indicate strength for the aesthetic and theoretical values as predictors of creativity.

2.1.2 Studies on Mental Ability of School Children

Chakrabarti (1988) has conducted a critical study to know the effect of mental ability of students on their academic achievement and other factors viz., socio-economic status of the family and educational environment in the family. The sample consisted of 500 students, both boys and girls from rural and urban areas. The data were collected with the help of the Socio-Economic Status Scale by S.K.Kulshrestha, Educational Environment in the Family questionnaire by A.S.Wadkar and Raven’s Progressive Matrices for measuring the mental ability of children. The collected data were analyzed by computing means, t-values and coefficients of correlation. The major findings of the study
were: (1) students from urban areas were found to be significantly better than students from rural areas in mental ability, (2) There was no significant different in the achievement of boys and girls.

Chatterji, P.S. (1983) conducted a Comparative study of personality, intelligence and achievement motivation of students from different academic groups. A sample of 760 male students studying in four academic groups, arts (N = 190), Science (N = 180), Commerce (N = 190) and agriculture (N = 200) of Class XII, was drawn from nine institutions. The Eysenck Personality Inventory Form A adopted in Hindi and Jalota's group Test of General Mental Ability were used as tools for assessing personality and intelligence of students respectively. Achievement motivation was measured by the Test developed by Gandhi and Srivastava (1980). This study indicates that Science students were the most intelligent rather than arts students. Further, the investigator found that scores on intelligence test in science group were significantly higher than those in all other academic groups with respect to all factors of intelligence, namely, verbal, numerical and reasoning.

Damle, K. (1987) made an experimental study of intelligence as related to Psychomotor Learning and Retention. Random sampling method was used for the selection of 500 subjects of first, second and third year degree course students from three colleges.

Raven's Standard Progressive Matrices (SPM), Minnesota Rate of Manipulation Test were used as tools for gathering information regarding the intelligence and psychomotor aspects respectively. The data were analyzed by
using analysis of variance, analysis of covariance, product moment correlation, F-ratio, t-test, and descriptive statistics. One of the major conclusions of the study was that the general intelligence significantly contributed in the learning and retention of the psychomotor skill.

Dubey, R (1984) made an attempt to investigate the difference in intelligence among neurotics, psychotics and normals. For this study, 60 subjects having neurotic trend, 60 subjects having psychotic trend and 60 normal subjects were selected on the basis of their scores on MMPI from the 600 subjects on whom the test was administered. Intelligence was measured with the help of the General Mental Ability Test developed by S S Jaltota. Data were analyzed with the help of Duncan's Range Test and Analysis of Variance. This study stressed that the group having psychotic trend scored low in intelligence, whereas neurotics were found to be slow in learning and grasping. In the contrast, normals were found to be intelligent rather than the two groups.

Jain, S (1983) studied the function of intelligence. It revealed that concept formation as a function of verbal intelligence. The sample of the study consisted of 405 students of Grade 10th of ten Hindi medium higher secondary schools of Bilaspur town, selected out of 1644 pupils on the basis of their extreme scores on intelligence and achievement motivation test. Tools employed were the Brunner, Goodnow and Austin's Test of Concept Formation and the PSM verbal test of intelligence. The data were analyzed by computing the percentile scores, t-values, Pearson's product-moment coefficients of correlation, ANOVA and F-values. This study concludes that the high intelligence students scored significantly higher on concept formation than low intelligence.
students. Further, there exists no significant sex difference in the concept formation ability of low intelligence group. Verbal intelligence was found to have more significant interactional effect on concept formation.

Reddy, O. R. (1983) studied the intellectual capacity of high school students. A sample of 360 students was selected from class VI, VIII, and X each class having high, middle, and low school performance students. The stratified random sampling technique was used to select sample for his study. Raven's Standard Progressive Matrices and a Family Background Questionnaire developed by the investigator were used as tools for this study. The finding shows that the intellectual capacity of high achievement groups was significantly higher than that of low achievement groups of students. Further, he found that the boys and girls did not show significant difference in their intellectual capacity levels except in case of Class X in which boys showed a significantly higher intellectual capacity level than girls.

Sharma, K., (1981) attempted to find out the impact of socio-economic status (SES) and caste on the development of intelligence. A sample of 400 male Hindu students of Classes X and XI was selected from three high schools. Singh's Socio-Economic Status Scale (rural), the verbal, numerical and Abstract Reasoning Test, Mohsin's General Intelligence Test (GIT), Raven's Standard Progressive Matrices and Personal Data Schedule as tools for data collection. The t-test, Chi-square technique, etc. were employed for drawing conclusions. This study concludes that socio-economic status has insignificant impact on verbal ability, numerical ability and non-verbal ability of students.

Tiwan and Rita (1984) attempted to study the intelligence of privileged and deprived children. For this study, a total of 600 students were taken from
secondary schools, identified as privileged and deprived by a panel of five experts. The data were collected by using the Culture Fair Intelligence Test of Cattell and Cattell adopted in Hindi. The privileged children displayed significantly higher general mental ability than the deprived students.

2.1.3 Studies on Visually Impaired Children

Research on the visual impairment is comparatively a modern discipline, yet in its infancy in India. Research opens the advanced frontiers of knowledge in the various areas of education, training and rehabilitation of visually impaired. In India, research on the visually impaired cannot be said to be neglected area but it has not gone parallel with the accelerated speed of services for the visually impaired. Now in India there is a growing realization of the need for researches in the area.

A visually impaired scholar states, 'Research alone can prepare the ground for pulling 10% of the population suffering from disability out of the depths of misery and lead them to a life of self fulfillment and community participation.' (Advani, 1985).

The existing researches on the psycho-educational Assessment of visually impaired in India have been reviewed and abstracted. The Psycho-educational assessment area seems to be a neglected area of research on the visually impaired. There are very limited number of tools available in this area. The National Institute for Visually Handicapped have taken up the job of developing tools for assessment and Standardized few tools for the Hindi speaking blind population.

Paknikar (1978) developed the first Performance Test of Intelligence for the blind in India. Though this work can be identified as a land-mark in the
history of testing in India, it lacks psychological properties. External criteria for validating the scores has not been taken into account in this test.

Kulshrestha and Kothiyal (1976) developed and standardized an adjustment inventory for the blind. This inventory was again revised in 1978, 1981, and 1984. The 1981 version is available in ink print as well as in braille. Kulshrestha and Srivastava (1982) developed an Interest Inventory and one Value Scale also. Both the inventories have satisfactory reliability and validity. Kulshrestha in collaboration with Sandhya and Dey (1985) developed an attitude scale for measuring the attitude of community persons towards blind students.

Singh (1984) standardized Hindi WAIS-R Verbal Test for the visually handicapped. One additional sub-test of similarities was added to make it more reliable and valid for the blind population. Split half, concurrent, and internal consistency methods were used for validation. Age, sex, and education-wise norms are available for this test. Singh (1984) also standardized Hindi version of HPQ (High School Personality Questionnaire) to measure the personality of the blind population. Reliability coefficient ranged from 0.73 to 0.91 and validity coefficients ranged from 0.47 to 0.80. Norms are available sexwise only. Mittal, Kulshrestha (1983) modified and adapted the Hindi version of Cattel's 16 Personality Factors Test for Blind population. Sushma (1984) developed an inventory for measuring the Reading Habits of the Blind. Mishra Rahinwal & Kulshreshtha (1981) developed a tool to measure the Mental Health of Visually Handicapped Children. Kulshrestha and Jangira (1984) attempted to develop a check-list for the development of blind infants and children.

Ahuja (1982) suggested the strategies of research in developing Educational Aids and Tests for the visually handicapped in India. Haldar (1944),

Kool (1981) explained about the memory of the blind. He used a sample of 378 blind matched with sighted blind-folded subjects. Reproductions of movement was examined in relation to recall delays and also in relation to variety of activities using linear slide experimental approaches. Findings were reviewed in the background of vocational educational and other rehabilitation issues of the blind. He suggested that the blind lack precision even when their task is pre-selected. It was advised that blind people should not be given jobs in vocations where targets change frequently. Development of effective motor program was also recommended. Skill requiring dependence and integration of auditory and kinesthetic modalities in the blind should be encouraged.

Kool and Pathak (1985), Kool (1980), Kool and Singh (1980), Kool and Rana (1980) and Singh (1980) have studied the short term recall; of linear and artlinear movements of blind and sighted, role of visual reference system and motor interference in coding, factual short term memory of blind and sighted, effect of pre-selection, prior activities and response based short-term recall of movements of blind and sighted subjects. Most of these researches revealed that the blind and the sighted differed on performance of linear and curvi-linear tasks. Role of imagery among blind and sighted was also compared. Manneristic
behavior of blind and sighted school children was compared by Advani (1981) using a sample of 342 blind and 365 sighted subjects. Trained teachers were used as observers who observed and rated the manneristic aspects. He concluded that four mannerisms namely head movement, eye poking and rubbing, clapping and jumping were found only in blind children. These were regarded as their adaptive mechanisms.

Chattopadhyaya and Palit (1982) conducted a study on arousal phenomenon among blind and sighted and found that blind revealed lower arousal than the normal. Kundu et al (1985) made an experimental study and compared muscular sensation of the visually impaired and sighted, using standard weight of 100 gms and series of nine comparable weights ranging from 92 gms to 108 gms and found that the blind were more sensitive in respect of muscular sensation as compared to the sighted. Singh and Bhandari (1984) and Singh (1984, 1985) studied personality dimensions (PENL) of visually handicapped and sighted, using Hindi HPQ on sample of 60 subjects. Results revealed that both the groups offered significantly on 3 dimensions of PE & N. The blind scored low on suggesting less tough mindedness and high on N and E than the sighted which accounts for their institutionalized stimulating social living.

Singh (1984) has also explored locus of control of male and female blind and sighted and found that the locus of control of blind and sighted did not differ significantly. Singh and Sharma (1984) analyzed the Intelligence Test Score pattern of visually handicapped and found that congenital blind and advent blind differed significantly on digit span subtest. Mittal (1983, 1984, 1985) studied personality factors of the blind and sighted adolescents using Cattel's 16
Significant differences were found between both the groups on factors B L O Q, Q3 and Q4. The research study conducted by Pathak (1985) revealed that in coding, storage and retrieval of distance, vision plays an important role. Results also demonstrated that in the condition in which the target point is selected by the subject himself and blind subjects failed to avail of this facility in coding, storing and retrieval.

Sinha (1985) and Kulshrestha (1973) studied the value patterns of blind adults. Both of the studies revealed that blind adults were high on religious, economic and moral values than the sighted. Kulshrestha (1976) in another study on aesthetic values of the blind, found that most significant differences were existing between the scores of the blind and sighted on this value. In 1978, Kulshrestha also suggested three ways of inculcating values in blind children. They were indoctrination, conditioning and effective approach.

Banaji (1985) in a review has narrated her experience in which she has emphasized the vital role of counselling and guidance in bringing about harmonious physical and mental development of a blind child. She advocated the procedures of counselling - advice giving, encouraging, information giving, test interpretation and psychoanalysts and group counseling.

Saxena (1982) explained the role of parental counselling services for improving quality of education in residential programmes. Singh (1985) stressed the use of guidance and counselling in a modular perspective of psychological help using other supportive measures like establishment of rapport, emphathic understanding persuasion, reassurance and externalization of interest. Rao (1983) has described various aspects that should be kept in mind.
while interviewing a blind client. Kool and Singh (1983) explained the role of crisis intervention services for newly blind in which common psychological and pathological reactions were described. They emphasized therapeutic aids for the handicapped to lead a normal life. Singh (1984) has found that early intervention and therapeutic help assists in acceptance of disability without which rehabilitation process is prolonged. He concluded this on the basis of the case histories of visually handicapped clients to whom crisis management and other related mental health services were extended at National Institute for Visually Handicapped (NIVH). Mattoo (1983) stressed the role of identifying the quantity and quality of stress and also the role of group therapy.

Paul (1973) studied anxiety among blind adolescents. Mishra (1975) and Mathur (1985) studied the socio-emotional factors determining social aggression. Nijhawan (1983, 1984) has given a detailed description of aggression among the blind which explains that aggression is very often misdirected among blind. Kalavathy et. al. (1985) explored the self concept and creative interest of blind and sighted students which clinically and therapeutically seems to be very important.

Mani, M N G (1993) studied the concept development of blind children. In his study, the concepts related to body awareness, object/situation characteristics, time and distance, spatial, skills oriented (action) concepts, measurement and environment have been considered as independent variables. The study yields a low-cost assessment kit to assess concept development of visually impaired children as well as sighted children also.

Gnanadas (1983) compared reading and listening comprehension of visually disabled boys and girls. He found no significant difference between them in reading and listening comprehension. He also reports insignificant difference between born blind and acquired blind children in reading and listening comprehension. Alexander (1985) indicates that visually disabled children of integrated education programs have better skills in associating activities for commonly associated Tamil words than those of residential children. She also reports that the age group 11-13 years exhibits better skills than the age-group 8-10 years. Jangira (1989) reveals congenial sociometric relations among visually disabled and non-disabled children in integrated setting. Rajasingh (1984) studied the general knowledge of visually disabled children of IX standard from integrated and residential settings. The test items covered daily living skills, history, geography, nature, vocabulary, arithmetic, science and sports. Rajasingh indicates that visually disabled children of integrated education have better general knowledge than those of residential schools. He believes that the superior general knowledge is due to the least restrictive learning environment of visually disabled children from integrated setting and their interaction with sighted peer group.
Similar studies support that the integrated setting is more conducive for the better academic and social life of the visually disabled child. Arokkyaraj (1984) found less number of undesired mannerisms in visually disabled children of integrated setting than those from residential settings. His checklist for the study consisted both favorable and unfavorable behaviors. He compared the mannerisms of sighted children, visually disabled children from integrated settings and residential settings. In general, visually disabled children exhibited more undesired behaviors than sighted children but the frequency of undesired behaviors was found to be more in residential children than integrated children. Eye-poking and rubbing were found in children from both settings. But, residential children exhibited behaviors like jumping, clapping, body rocking, head movement, swaying etc. The investigator describes that eye poking and rubbing are associated with the irritation the blind eye might cause but other behaviors exist as a defense mechanism. He writes that those undesired behaviors could be decreased either by constant reminder or by substituting desired activities in the place of undesired behaviour.

Murugesan (1985) studied the spatial, directional and positional concepts of visually disabled children of residential and integrated settings. He states that integration of visually disabled and sighted children is more conducive for the concept development of visually disabled children. Ebenezer (1988), mentions that the performances of low vision children from integrated schools are better when compared to those from residential schools. Josephin (1985) reports superior braille reading skills in visually disabled children of primary graded from integrated setting. These studies agree with the statement of Bourgeault (1975) that blind children grow and flourish in the least restrictive
environment. They also ascertain that integrated education has a positive influence on the overall development of visually disabled children.

A study conducted by the National Institute for the Visually Handicapped (1981) in India found that visually disabled children exhibited more undesired behaviours than the sighted children. Several techniques such as contingent management, substituted activity, reinforcement, positive feedback, are employed to reduce the undesired behaviors in blind children. Barton and Lagrow (1983) used overprotection procedures (i.e., to exert a controlling over the undesired behavior) to reduce self-injuries and aggressive behavior in blind children.

2.2 Studies Conducted Abroad

A good number of studies have been conducted in foreign countries on the different aspects of visually impaired. These studies are presented in the following headings.

2.2.1 Studies on Visually Impaired Children

Samuel P. Hays (1941) was the pioneer in the area of intelligence testing of blind individuals. In his classic contribution to a psychology of Blindness, he reported on the IQs of blind individuals that blindness does not automatically result in lower intelligence. Some children who have shown low IQ scores for a number of years in a sheltered environment suddenly make dramatic gains when given adequate educational opportunities. In a 1950 study, Hays found that visually impaired are not disadvantaged, particularly in verbal intelligence, and that there is no relationship between the age of onset of blindness and IQ. Some of the studies conducted by Ohwaki, Tanno, Ohwaki, Huriu,
Hayasaka (1960) indicates that visually impaired people are not markedly lower than sighted people in IQ as measured by Standardized verbal intelligence tests. Gottesman (1976), Stephens and Grube (1982), Stephens and Simpkins (1974), Witkin (1968) were conducted studies on Mental ability of visually impaired children. A substantial amount of research on other than standardized verbal intelligence tests suggests that the development of cognitive abilities in visually impaired children lags behind that of sighted children.

Higgins (1973), Nolan and Ashcroft (1969), Singer and Steiner (1966), Suppes (1974), Tillman (1967) conducted studies on thinking ability of visually impaired children. They found visually impaired children are poor in abstract thinking tasks and shows less interest in involving abstract thinking tasks. On the other hand, visually impaired children were much more likely to deal with their environment in concrete terms.

Bateman (1965), Matsuda (1984), and McGinnis (1981) conducted studies on language development which is important for verbal creativity. Their studies report that lack of vision does not alter ability to understand and use language. They point out that visually handicapped students do not differ from sighted ones on verbal intelligence tests. But the few minor aspects of communication, such as gestures, have been found to differ in visually impaired individuals. The blind child is still able to hear language and may even be more motivated than the sighted child to use it because it is the main channel through which he or she communicates with others.

A study conducted by Witkin et al. (1968) on attention of visually impaired indicated that visually impaired people develop an increased ability in
attention because their reliance on other sense is necessarily greater, and absorbing information from other sensory modalities requires a great deal of attention. Further this study found that the visually impaired people have been shown to be very good at listening tasks.

Halpin, Halpin and Torrance (1973), Tisdull, Blackhurst and Marks (1971) conducted studies on creative thinking of visually impaired children. Almost all these studies indicate that visually impaired children scored high on measures of creativity.

2.2.2 Studies on Onset of Blindness

That many blind children lag behind sighted youngsters in their acquisition of concepts is not in question. It should be kept in mind, however that this is not true for all visually impaired individuals, especially those who are partially sighted children (Brekke, Williams, and Tait, 1974; Tobin 1972) and those who have become blind after birth. Partially sighted children may still exhibit difficulties in conceptual development, but they will generally be at a distant advantage over totally blind children. The value of even a small degree of sight can be enormous in helping children tie things together in order to form concepts (Hallahan and Kauffman, 1988). Likewise children who are able to gain some visual experience before losing their sight will be able to rely on these experiences to some degree. Although it is not possible for children who are blind from birth to acquire some concepts as rapidly as children who become blind after a few years of sight (Birns, 1986), most professionals agree that children blind from birth generally have a more difficult time learning many concepts. Such things as degree of impairment, age of onset, and motivation often determine how much difficulty the visually impaired child will have in conceptual thinking.
Mixed effects of the onset of blindness and the acquisition of concepts are discernible. Bradley-Johnson (1986) indicates that the development of concepts is more difficult for a child with a visual impairment or who is totally blind than a sighted child, particularly if loss of vision occurred before the age of five. Scott, Jan, and Freeman (1985) suggest that children with visual impairment or blindness should learn position concepts early. It may take a visually disabled child longer to learn concepts such as left, right, and up, so there is a need to begin teaching them as early as possible. Further these children must rely heavily on these concepts more so than sighted children, to function effectively. The use of personal pronouns such as "I" and "You" may also take longer to develop (Fewell, 1983; Goldman, and Duda, 1978). Birns (1983) compared congenital and adventitiously blind children. Spatial tasks determine the effect of the age at which they had lost their vision on the acquisition of space concepts. Twenty-three children, ages 6-12 with light perception or less, participated as subjects. The results indicated that blind children acquire topological space concept, but only about half are able to make transition to the conceptualization of previous space. However, no relationship was found between the age at which children became blind and their performance on tasks.

An atypical pattern in blind children in developing the concepts of left and right was observed. In addition, it was noted that, unlike sighted children, there was no systematic progression by age in the achievement of Piagetian stages of space development. It was concluded that age of onset of blindness is not the sole nor most important factor in the development of concepts, and that congenital blindness in itself does not prevent a child from mastering projective space concepts. Referring to the early experience and spatial functioning in the
blind child, several research studies in the past and present report superior performance by adventitiously blind subjects relative to congenital blind subjects on tasks where stimuli were complex, but not on tasks where the stimuli were simple, novel, and/or apprehended only through locomotion.

2.2.3 Studies on Body Awareness of Visually Impaired Children

Body image may be defined as the knowledge of one's body parts, the function of each, and their relationship to one's spatial environment (Lydon and McGraw, 1982). According to Cratty and Sams (1968), body image may be divided into the following categories:

**Body planes**
- Location of self in relation to body planes, i.e., sides, front and back

**Body parts**
- Ability to name and locate various parts of the body

**Body movement**
- Gross motor movement and various limb movements

**Laterality**
- Identification of left and right sidedness in addition to knowing left and right body parts

Directionality
- Projection out, away from the self, in terms of left-right, front-back, up-down
- Positioning oneself so that the left-right, etc. are nearest to object's movement in relation to left-right etc

Knowledge of objects in terms of left-right, etc.
- Relating objects to self in terms of left-right etc
To develop an accurate body image and to understand the function of body parts, the child needs some basic knowledge of the structure of his body. Lydon and McGraw (1982) suggest that we should tell the visually disabled child that the body is composed of a few large bones and many smaller bones, and that where two bones meet, a joint is formed. He should be explained that the design of the joint regulates the range of motion and be allowed to experiment with his own body. Freedom of movement should be encouraged during the early stages of the child's development in order that he begins to develop an accurate assessment of the capabilities and limitations of his body. This process of self-assessment should continue as the maturation process continues (Connecticut Institute for the Blind, 1965).

Posture is usually defined as the relative arrangement of the parts of the body. "Poor posture is a faulty relationship of various parts of the body which produce increased strain on the supporting structures and in which there is less efficient balance of the body over its base of support (Metheny, 1952). It is often difficult to motivate the blind child to maintain good posture. This is because many of the postural abnormalities are due to a fear of movement and an uncertainty of the surrounding environment. If the child is not secure in his environment (even in a small room), he will revert to protective postural abnormalities (Lydon and McGraw, 1982).

Millar (1985) investigated how children code the location of objects in blind conditions. Experiment I tested recall of locations with repeated and changed recall movements under normal and out-of-line body-to-target orientation in eight younger (mean age 8 years 10 months) and eight older (mean age 10 years 11 months) blind subjects. Results show that changed movements
produced target undershooting and inaccurate path-keeping by older subjects, particularly for horizontal directions. Errors on younger subjects depended more on body orientation. Experiment II tested 32 blindfolded sighted children (mean age 8 years 8 months) under the same conditions with four forms of coding instructions. Subjects showed no effect of body orientation but changed movements had similar effects on target localization as for older blind subjects, regardless of instructions. Different forms of instruction affected bias from movement directions in neat and far sectors of the display differently, and instructions to code by reference to the shape of the display surround eliminated the differences. It was argued that blind and sighted subjects used extent and direction cues from the positioning movement in locating targets, and that these are not automatic effects but resulted from subjects’ assessment of the informal conditions.

2.2.4 Research on Object/Situation Characteristics

Several researches have noted that congenital blind children conceptualize the world differently from their sighted peers because the lack of vision hampers their integration and organization of sensory information, limits their mobility, and obstructs their interaction with objects, events and other persons in their environment (e.g., Santin and Nesker Simmons 1977; School, 1973; Wills, 1965). However, as DuBose (1976) and Swallow (1976) observed, delays in physical and motor development could cause young children to have a limited or diverse knowledge (construction) of the world of objects. Sighted children's mental images or concepts of objects, which are based on their visually directed experience of objects, may not match those of blind children, which are generated through touch, hearing, smell and taste - sense that are thought to provide inconsistent bits of information (Davidson, 1972; Foulke, 1962; Santin
and Neskar Simmons, 1977) If blind children's concept of object is different from that of sighted children because of their unique means of experiencing (and hence imaging) objects, then it could be said that blind children operate from a different "data base" in deriving the meaning of words and concepts (Anderson, 1984). The issue of object concept and word meaning is related to that of verbalism (Cutsforth 1951), which has been widely research in various results (e.g., Anderson and Olson, 1981; Burlingham, 1961; Dokecki, 1966; Harley, 1963; Nolan, 1960; and Wills, 1965). The issue has not been resolved, partly because little is known about the development of language and cognition in blind children.

Hampson and Duffy (1984) compared 8 congenital blind, 8 sighted, and 8 blindfolded sighted female school students (mean age of 16 years) using a selected inference technique. Subjects categorized the words of sentences and corners of figures while responding either spatially (by typing), verbally, or while tapping. Spatial responding slowed response times more than tapping or verbal responding. No major differences were found between the response patterns of the three groups. It is argued that many imagery tasks involve a heavy dependence on spatial information processing, and to the extent that blind and sighted perform similarly in such situations, it follows that they are using similar spatial representations.

2.2.5 Studies on Spatial Awareness of Visually Impaired

A number of interesting studies have emerged in the field of spatial relation and blindness. In a classic study conducted over three decades Worchel (1951) examined children’s and young adult’s ability to deduce spatial relations among locations in a large-scale environment. In one task, blind-folded sighted subjects, congenital blind students and adventitiously blind subjects walked
along two sides of an imaginary isosceles triangle and then were asked to return to their starting point by way of the hypotenuse of the triangle. In the second task, subjects walked along the hypotenuse of the imaginary triangle and were then asked to return to their starting point by way of a path along which they would make a right angle turn. Worchel found that sighted subjects performed more accurately than the blind subjects. In a similar study, Landau, Gleitman, and Spelke (1981) assessed the ability of a 25-year-old congenitally blind child to deduce spatial relations among four locations in a room. The child was led among several routes connecting the four locations and then asked to travel among the locations by taking routes not experienced previously. In contrast to the finding of Worchel (1951), the blind child performed as accurately as 3-year-old sighted children who wore opaque goggles. Based on these two studies, it seems that blind individuals can deduce spatial relations among locations in a large-scale environment but may not always be as accurate as sighted subjects.

Von Senden (1960) concluded from his observations that a true memorial representation of space is not possible without vision. Revesz (1950) purported that without vision, there can be a memorial representation of space, but that it must be impoverished. Warren (1980) on the other hand maintains that whatever the spatial cognition of the blind may be, it depends on different sensory data from those used in the spatial cognition people, follows its own course of perceptual and cognitive development, and cannot be disclosed simply by comparing the performance of blind and sighted subjects on tasks requiring spatial ability. The concept that appears to cause blind children more difficulty than any other is that of space. Although there are studies showing blind people to be inferior on spatial concepts, (Hartlage, 1967, Juurmaa, 1967, Swallow and
Poulsen, 1973), a number of studies have demonstrated that spatial conceptualization is not impossible for blind individuals (Birns, 1986; Hartlage, 1973). Blind people apparently learn spatial concepts by the use of senses other than vision. Hartlege (1967) mentions that blind people sometimes develop an appreciation of space by noting the time it takes to walk various distances. Telford and Sawrey (1977) state that knowledge of spatial qualities of objects is gained by the blind largely through touch and kinesthesia. Therefore, there are ample research evidences to support that the tactual sense, in fact, is the primary way which a variety of concepts are acquired through by the blind child.

In practical aspects, the spatial ability of blind people has been studied in an effort to solve specific problems, e.g., the design of electronic travel aids (Armstrong, 1975; Brabyn, 1978; and Kay, 1974), the formulation of training methods employed by Orientation and Mobility specialists (Cratty, 1967; Juurmaa 1970; and Rice, 1967), and the design of displays of graphic information (Beria, Butterfield and Murr, 1976; Gill and James, 1973; Nolan and Morris, 1971). In some experiments, blind subjects performed tasks in far space (e.g., Cratty, 1971 and Juurmaa, 1973). In few experiments (e.g., Casey, 1978; Leonard, and Newman, 1970), blind subjects performed tasks in the real world and the performances of these tasks demanded the skills on which mobility depends.

A few studies tried to test the differences in how the two hemispheres of the brain handle spatial information. In a research conducted by Dodds (1983), congenitally blind, adventitiously blind, and blindfolded sighted subjects tactually examined a target shape and selected its duplicate from three shapes
placed in different orientations relative to the target. The performances of all
groups declined as the relative dis-orientation between the target and its
duplicate increased, suggesting that visual imagery is not crucial to mental
rotation. In addition, the sighted subjects performed better with the left hand than
did the blind subjects. Because braille is usually read with both hands, this
difference was surprising. The author speculates that the sighted subjects were
able to record the tactual information into both the verbal and visual modes
whereas the blind subjects relied on the left hemisphere's verbal strategy only.
Hollins (1986) examined whether spontaneous variations in the frame of
reference occurring over a time have a more substantial effect on haptic
mental rotation abilities of four blindfolded sighted subjects than of four
adventitiously blind subjects. Results indicated that the mental rotation functions
for the two groups were virtually identical. This area may be of great interest to
those who wish to study the learning styles of blind children who have learning
disability too.

In a novel and interesting study, Chin (1984) investigated the effects of
dance movement instruction on the spatial awareness of elementary visually
impaired students, and on the self-concept of secondary visually impaired
students. Sixteen Mexican, American, Indian, and Anglo visually impaired
children of elementary residential schools participated in Experiment I, and 24
Mexican, American, Indian, and Anglo secondary visually impaired children in
Experiment II. In both the investigations, the experimental groups received
20 hours of dance movement instruction over a period of 10 weeks. In
experiment I, results indicated that a physical education program supplemented
by dance movement instruction might enhance the development of spatial
awareness in elementary level visually impaired children. In experiment II, findings did not indicate that dance movement instruction would be effective in enhancing the self-concept of secondary level visually impaired students. Since dance instruction involved physical activities, visually impaired children acquired spatial concepts in the process of learning.

2.2.6 Skills and Activity Oriented Concepts

Piaget and Inheler (1948) stated that cognitive activities develop as children interact with their environment and develop concepts. Vision is an important perceptual system in developing awareness of objects and parts of one's own body - their relationships, movements, and functions. Through vision, one can view the totality of objects and develop concepts quickly. Development of concepts helps the individual to involve with the tasks and develop required skills. Vision is also an efficient system for developing self-to-object and object-to-object relationships (Hill and Hill, 1980). Cutsforth (1951) and Harley (1963) wrote extensively about the ability of many congenitally blind children to verbalize certain concepts without directly experiencing them sensorily. Due to these limitations, development of skills becomes imperative for a visually disabled person to use his remaining senses effectively to interact with the environment. The very "heart" of the orientation and mobility instruction stresses the use of the senses to develop body and object concepts, self-to-object, and object-to-object, relationships (Hill, Smith, Burk and Rosen, 1986). Therefore, the skills development in them helps to reach out and have better understanding of the external world.

2.2.7 Studies Related to Measurements

In a research study, Lederman, Klatzky, and Barber (1985) used seven experiments to investigate the heuristics people use to encode spatial pattern
information through touch. Observers traced a tangible pathway with one hand and then answered questions about either the euclidean line between the pathway endpoints or the pathway itself. Parameters of the euclidean line were held constant, while characteristics of the felt pathway were manipulated. Experiments I-IV showed that 72 blindfolded university students and 30 blind 18 to 65 years-olds increasingly overestimated the length of the euclidean line as the length of the explored pathway increased, which indicated a movement based heuristic for encoding distance. Experiments V - VII, with 40 normal undergraduates, showed that judgments of the position of the euclidean line did not vary with the position of the felt pathway or the extent to which it deviated from that line. Instead, results indicated that subjects relied on implicit spatial axes, which were movement independent, to judge position. Usually disabled children usually find it difficult to relate knowledge in measurements to practical situations. For example, a child may know that 3 feet is a yard but may not be able to show how long is a feet (Mukhopadyay, Mani and Jangira, 1985).

2.2.8 Studies on Orientation of Environment and Mobility

Blind children have difficulty in acquiring orientation concepts necessary for proficient locomotive movements and independent mobility. Majority of the past research on remedying conceptual deficits focused on older visually disabled individuals. Development of programs for preschool visually disabled children is essential in order to compensate their orientation deficits. Skills necessary for acquisition of orientation concepts should be taught through movement programs at an early age in the normal development sequence instead of attempting to remedy deficits, at a latter age (Palazesi,
Lockman, et. al. (1981) indicate that representations of spatial knowledge are related to person's mobility performance in space. There is a need for objective measures of spatial learning and orientation. Although some attempts have been made to evaluate basic types of mobility skills such as walking in a straight line (Armstrong, 1975; Kay 1974), the evaluation of a person's knowledge concerning the layout of an environment has proved to be difficult. Cratty and Sams (1968) found in visually impaired children (having a mean age of 10) a major inability to make accurate left to right judgments and discriminations, plus a lack of perceptions of the body imagery. They also noted a marked relationship between movement ability and body perception. Hill and Hill (1980) in revising and validating "The Hill Performance Test of Selected Concepts" (for ages six to ten) assessed spatial concepts in visually impaired children and found them developed through the haptic sense. Several researchers addressed the spatial orientation deficit of the visually impaired child and attempted to remedy it. Orientation is defined as an awareness of present position in space, destination, and movement through space (McLinden, 1981). Palazese (1986) suggest that the basic concepts and verbal descriptions of spatial relationships can be paired with movement patterns, to give the visually impaired pre-schooler an accurate view of the concepts presented. Specific aspects of mobility and orientation of the blind attracted the attention of researchers for a quarter of a century. Generally speaking, their work can be placed in four fields of study. First, interest has been focused on the capacity of blind people to move unaided in various settings and to mentally map an environment. A second preoccupation revealed in the literature has been the spatial information transmitted to the visually handicapped by tactile maps, by adapted sign systems and by electronic guidance systems. Other projections have focussed on the
environment in which the blind persons move and on the environmental aspects that affect their mobility. Finally some researchers investigated how the development of technical aids has facilitated the mobility of blind people (Passini, Dupre, and Langlois, 1986).

Knowledge of locations and relationships shapes cognitive images of the environment and affect spatial decision making and behavior (Andrews, 1983). Many authors have addressed the role of tactual maps in the cognitive functioning of blind persons (Herman, Herman, and Chatman, 1983; Andrews 1983). An experiment was conducted by Hollyfield and Foulke (1983) to determine what blind pedestrians learn and remember about a space as their experience with it accumulates. Two independent variables, practice and visual status, were assessed in terms of their effect in pedestrian's memories of objects along a route, and of the route itself. Results showed similar abilities of blind and sighted pedestrians to learn routes, but significant difference in their memorial representation of objects. The adventitiously blind persons' cognitive mapping is superior to those of the congentially blind. The past visual experience helps individuals to acquire spatial information from large scale environments (Hermann, Chatman, and Roih, 1983). While tactile maps are suggested for better cognitive functioning of the blind person, it must also be noted that they may cause confusion to the blind person if the textures used in the map are too complicated to explore (Mani, 1985). Use of tactile maps has been very significant in the teaching of orientation skills to the individual so that he can move independently with minimal problems. A person who learned the spatial pattern of each route separately would not be able to figure out novel paths from places previously learned along one route to other places previously
experience would be to resemble a cognitive map in which numerous spatially
patterned routes are themselves integrated within a common frame of
reference. This form of organization has the advantage of allowing travel of
many routes in a layout after memorizing only a few of them (Lockman Reiser,
and Pick, 1981). Tangible graphs have been extensively used, both in educational
and environmental settings to improve the spatial abilities of the blind individual.
Even though these are not substitutes for the lack of visual perception, they
help to a great extent in cognitive mapping (Mani, 1985). Tangible graphs are a
viable source of spatial information for blind readers (Lederman and Campbell,
1983).

2.2.9 Studies on Behavior and Learning of Visually Impaired Children

Dearth of research is evident in the area of behaviour analysis of
visually disabled person, but behavior analysis has significant status in the
education of visually disabled children. The absence of sight in the individual
results in behaviours which are typically named "blindisms". In order to improve the
mobility of severely retarded blind girl, Kennedy (1982) used the technique of
reinforcers. In a multi-element baseline design used with the subject, rubbing the
subject's shoulders, using expression of verbal praise, and administering
vibration to spinal area were each paired with a cue to serve as a potentially
discriminative stimuli and were alternated randomly within each session. The
vibration was demonstrated to be the most effective reinforcer for the subjects
mobility. Wilson and Barton (1984) report that the eye poking behavior of a 6-year
old blind child was significantly reduced during orientation and mobility training
through the use of a differential reinforcement for the omission of behavior
program. Iverson (1986) found that the addition of a neurological disease or
disorder to the visual impairment increased the variety of stereotypic behaviours in blind children. Abang (1985) argues that blindisms may be due to the fact that the blind child is never reminded visually of the gestures, mannerisms and attitudes of sighted people and cannot see how his own. The above references might be useful for the researchers who are interested in behavior modification of visually disabled children. The current research includes observation of behavior in visually disabled children with their concept development scores. However, these studies provided guidelines for preparing observation schedule for the study.

2.3 An overview of Research Reviewed

An analysis of the studies abstracted in the two previous Surveys of Research in Education (1983, 1987) indicated that studies on Divergent Thinking have been conducted under three major aspects as (1) Test construction, (2) Correlation studies and related researches, (3) Intervention studies of fostering creativity. It seems that researches have not been prolific and much has not yet been accomplished in terms of quality and quantity when compared to international contribution. It warrants that researches on various aspects related to divergent thinking are to be systematically encouraged.

Wallach and Kogan creativity test, Torrence Test of Creative thinking, Passi's Test of Creativity and Bacquer Medhi's creativity test of modified versions in different languages have been frequently used as tools to assess in good number of research studies. The review shows that these divergent thinking tests are not adapted for Tamil speaking students, especially for visually impaired individuals.

Number of factors have been identified in recent years reflecting their influence on convergent and divergent thinking. In general these factors
have been classified as background or demographic variables, psychological variables and organisational variables. The background variables included in the studies were sex, birth order, socio-economic status and size of the family children hail from. The studies conducted by Marl'ls (1971), Strauss and Strauss (1968), Kelly (1965), Dhir (1973), Guilford (1964), Hurlow (1967) and Middents (1968) found that boys were significantly more creative than girls. Further, the review shows that first born to be generally over represented amongst inventors (Sampson, 1965; Eiseman and Schussel 1970, Altus 1966 and Eiduson 1962). The influence of socio-economic status in creative thinking has also been explored in a number of studies (Torrance 1978, 1979 and Feely, 1972) which reveal that individuals with disadvantage socio-economic status possess higher degree of creative potentiality than the individuals hailing from advantaged and affluent socio-economical background.

The psychological variables such as scholastic achievement, intelligence, academic motivation have been studied in the contrast of divergent thinking and convergent thinking of an individual. Liddicoat (1972); Getzel and Jackson (1962), Tuler (1964), Cicirelli (1965), Molly (1971), Paramesh (1972) and Starr and Nicholl (1975) observed that typical underachiever is more creative. Similarly, Andrews (1930), Gatzel and Jackson (1962), Cropley (1966), Raina (1968), Kire (1971), Meer and Stein (1955), Hudson (1967) and Ripple and May (1962) have found low but positive relationship between creativity and intelligence. On the other hand, Holland (1961), Taylor and Holland (1962), Shey Coft et. al (1963) noted that intelligence has little or no inter correlation to creative performance. Thus, it appears that the findings are conflicting and contradictory with respect to relationship between mental ability and divergent thinking.
Organizational variables in the school context, organisation climate of school, type of school (basis of sex) management of school have been taken up in a number of studies to identify their role in fostering convergent and divergent thinking. (Riddle, 1970; right 1974; Haddon and Lytton 1971 et. al.) Most of these studies stressed that the school climate is very important to the growth and development of the creative abilities in a child. In contrast, some have reported no relationship between the organizational climate and creativity (Clark, 1972; Marburg 1970; Solomon and Kendall, 1976).

Research on mental ability of school children reveal that a good number of studies have been carried out in India and abroad. Most of the studies attempted to find out the relationship between Achievement, motivation, learning, retention, personality, concept formation and socio-economic status. But Research on the Visual impairment is comparatively a modern discipline, yet in its infancy in India. From existing researches on the visually impaired in India it seems that psycho-educational assessment area is conspicuously missing (Buch 1982; 1988). Few attempts have been made to develop tools to assess psychological aspects of visually impaired individuals. The worth mentioning are Patrikar (1978) test of intelligence for the blind, Kulshrestha and Srivastava (1982) interest inventory and value scale, Sushma (1984), reading habit test, Mittal and Kulshrestha (1983) modified version of Cattel's 16 Personality Questionnaire and Kulshrestha and Jangira attempt of checklist for the development of blind infants and children. Apart from these tools, the National Institute for the Visually Handicapped adapted few performance test for visually impaired children. Few attempts have been made by the NCERT sponsoring major Research Projects in the field of Visually impaired (Mani, M.N.G. 1993), particularly studies on concept development and low vision.
At Master level, there are studies conducted in different areas such as achievement orientation and mobility, teaching strategies and Rehabilitation of visually impaired. But the review indicates that not even a single study has been conducted on Divergent and Convergent thinking of visually impaired children in Indian setting.

The foreign research works related to visually impaired have revealed that a good number of studies have been done in different dimensions such as onset of blindness, body awareness, object/situation characteristics, spatial awareness, activity oriented concepts, studies relating measurements, orientation and environment, behaviour and learning.

Most professionals agree that children blind from birth generally have a more difficult time in learning many concepts (Birs, 1986). Likewise, partially sighted children may still exhibit difficulties in conceptual development rather than totally blind children (Hallahan and Kauffman, 1988).

Several researches have noted that the lack of vision hampers their integration and organisation of sensory information, limits their mobility and obstructs their interaction with objects (Santin and Nesker, Simmons 1977). Vision is an efficient system for developing self-to-object and object-to-object relationship (Hill and Hill, 1980). But many congenitally blind children verbalise certain concepts without directly experiencing their sensory. Due to these limitations development of skills becomes imperative for visually impaired individuals (Smith, 1951, Harley 1963). Children have difficulty in acquiring orientation concepts necessary for proficient locomotive movements and independent mobility (Palazesi, 1986, Lockman, et. al. (1981), Armstrong, 1975), Kay, 1974, Cratty and Sams, 1968).
But there is dearth of research in the area of behaviour analysis of visually disabled children eventhough behaviour analysis has significant status in the education of visually disabled children.In the reviewed researches most of the studies on convergent thinking, and mentally concerned with normal sighted children. Very few studies have been reported on divergent, convergent thinking and mental ability with special reference to visual impairment in foreign context. The investigator could hardly find studies related to convergent and divergent thinking of visually impaired in Indian situation.

This may be done to the lack of tools to assess the different psychological aspects of the visually impaired children, particularly in Indian setting. Naturally, these psychological tools are of immense use in the field of education and rehabilitation of the visually impaired. Attempts to develop certain tools to assess the psychological aspects particularly the convergent and divergent thinking of visually impaired children and mental ability of the same children is the need of the hour. The information gathered through this psychological test will be immense use for the programmed planners and implementors in the educational and rehabilitation of the visually impaired. The present study is an attempts in this direction.

The statement of the problem of the present study is presented in the next chapter.