CHAPTER - 2
REVIEW OF RELATED RESEARCH

Review of related research is an important step in conducting an investigation. It extends a lot of facility to the researchers in sharpening the problem, framing the research hypotheses, reflecting the tools, identifying an appropriate research design and exploring the ground for undertaking the study. A number of authorities on educational research have recommended to review the related literature. In the present chapter, an endeavour has been made to review the studies on learning styles conducted in western countries as well as in India. Various studies have been presented on different but significant variables in order to show the witness of the literature and current position of research arrow the theme of the study chosen by the present investigator.

(SECTION-A)

2-1 COGNITIVE FACTORS AND LEARNING STYLES

In this section studies on learning styles have been discussed which disclose their relationship with intelligence, critical thinking, cognitive development, creativity and academic achievement.

2-1.1 INTELLIGENCE, CRITICAL THINKING AND LEARNING STYLES

A little research has been conducted on the relationship of intelligence, critical thinking and learning styles. Some of these have been presented below:

Schmeck and Ribich (1978) reported that students who scored high on critical thinking, scored high on deep processing but low on methodical study. This exposed those high reflective thinking skills for the deep processors but low skills for methodical students.
Stewart (1979) inquired into the difference in preferred learning styles between gifted and students of general population. He found that level of IQ had an effect on learning style preference.

Tracy, Schmeck and Spofford (1982) in their study of determiners of vocational interest found that deep processing style was related to the measure of verbal ability.

Pieronek (1980) reported that there was a significant relationship between intelligence and learning style. Students with highest IQs were identified as having creative learning style.

McDaniel (1982) found that Deep Processing and Elaborative Processing styles of learning were positively related to verbal ability.

Ricca (1983) carried out an investigation to explore the degree of difference in gifted students and general population students. The findings exposed that IQ was most highly related to negative preference for structure and preference for adult motivation.

Vignia (1983) conducted an investigation to identify the learning styles differences between gifted and non-gifted high school students. The result indicated that gifted high school students scored higher than non-gifted high school students on cognitive characteristics. The elements that were preferred by gifted high school students were authority figure present, visual, kinesthetic, and late morning for studying.

Perrin (1984) carried out an investigation to analyze the relationship between intelligence level and learning styles of gifted and normal primary school children. The analysis of the data of this experimental study yielded no significant differences between intelligence level and learning styles.

Westhafer (1985) undertook a study to assess preferred learning styles of high school students and gifted high school students. Analysis exposed significant differences on the learning style variables. Projects, teaching, games and programmed instruction were enjoyed more by high school students while discussion and independent study were preferred more by gifted high school students.
Sintra, Primavera and Waked (1986) studied the relationship between learning style and intelligence of reading disabled students. Intelligence was found to be positively related in case of formal design and negatively related in case of learning with adults.

Hackman (1988) designed a study to determine whether differences exist between gifted and non-gifted students in their learning style preferences. Findings of the study revealed that significant learning style differences existed between gifted and non-gifted students. Gifted students, as opposed to their non-gifted peers, expressed strong positive preferences for a cluster of self-directed instructional activities (independent study, discussion and teaching games) and strong negative preferences for several teacher-directed activities (lecture and programmed instruction) whereas on the other hand non-gifted students showed positive preferences for a cluster of teacher-directed activities (programmed instruction, lecture and teaching games) and milder preferences for instructional activities (projects and discussion). From this it may be inferred that intelligence has a relation with learning style.

Verma and Tiku (1990) studied the effects of socio-economic status and general intelligence on learning styles of high school students. It was observed that the main effect of general intelligence on learning styles did not come out to be significant except in case of avoidant learning style. The low intelligent students showed greater mean score on avoidant learning style as compared to high intelligent students. Another finding revealed that there was no significant interaction between socio-economic status and general intelligence with regard to independent, dependent, participant, collaborative, competitive and avoidant learning styles of high school students.

Gallucci (1991) attempted to investigate the relationship among the learning style preferences and intelligence of gifted and normal intermediate students. The data revealed that among the fourth graders, the normal students were discriminated from the gifted students on the variables of noise and responsibility on LSI scales whereas for fifth and sixth grade gifted and normal
students, data indicated that gifted students scored higher on the LSI scales: Persistence, Structure, Evening and Afternoon at 0.03 level.

**Cronwell and Manfredo (1994)** found that out of four primary learning styles doing, thinking, watching, and feeling on Kolb’s LSI thinking was positively related to mental ability measure.

**Kumari Balesh (1995)** investigated the learning styles of socio-economically advantaged and disadvantaged adolescent students in relation to intelligence, locus of control and personality types. She reported that intelligence was found to be related to short attention span vs long attention span learning style in case of socio-economically advantaged students. High intelligence students preferred short attention span whereas low intelligent students exhibited their preference for long attention span style of learning.

**Clocklin (1995)** took a study to determine if a relationship existed between the manner in which nursing student preferred to learn and their ability to think critically. The Kolb’s Learning Style Inventory and Watson Glaser’s Critical Thinking Appraisal (WGCTA) are administered to all students. The findings revealed that a significant relationship appeared to exist between critical thinking skills and preferred learning style. Students categorized as diverger had lower mean composite scores on the WGCTA than did those categorized as assimilators, accommodators or convergers. The convergers had the higher mean scores.

**Fuji (1996)** explored potential utility of understanding a brain injured individual’s premorbid learning style in conceptualizing process underlying cognitive deficits. The results indicate the converger and diverger learning styles on Kolb’s LSI are significantly correlated with a factor of stronger verbal versus non-verbal reasoning which was measured through Weschler Adult Intelligence Scale.

**Verma (1996)** undertook a study to explore the differences in learning style preferences of the gifted adolescents. The results revealed that intellectually gifted adolescents as a group had preference for individualistic, flexible, visual, field-independent, long attention span, motivation centered and
environment oriented learning style over non-individualistic, aural, field-dependent, short attention span, motivation non-centered and environment free learning style respectively.

Nathan (1997) explored the association between critical thinking and learning styles of nursing students. The subjects completed the Watson’s Critical Thinking Appraisal (WGCTA) and Kolb’s Learning Styles Inventory (LSI). No significant relationship between WGCTA and learning style was observed from the findings.

Whitcomp (1999) attempted to find out the link between student cognitive development to learning styles preference, cognitive development was measured by the Parker Cognitive Development Inventory (PCDI) learning style preference was determined by the Kolb’s Learning Style Inventory (LSI). The results showed that a significant relationship existed between cognitive development and learning style preference with dualistic students adopting learning style characterized by higher levels of reflection over action and more relativistic students favoring activity over reflection. Additionally, relativistic students showed a preference for greater concreteness in their learning.

Thompson (2001) attempted to discover the relationship between critical thinking and learning styles of students. Kolb’s Learning Styles Inventory and Watson-Glaser’s Critical Thinking Appraisal were used for data collection. The findings showed that abstract conceptualization was the only relationship to students’ raw scores on WGCTA of the four learning styles on the LSI. Assimilators (a combination of Abstract conceptualization and reflective observation) and Converger (a combination of abstract conceptualization and active experimentation) demonstrated a significant relationship to the ability to think critically.

Vandana (2004) investigated the relationship between emotional intelligence, critical thinking, personality types, learning styles of prospective secondary teachers and reported that low emotional intelligent prospective secondary teachers had higher level of reflective, intuition and verbal learning style than high emotional intelligent prospective secondary teachers.
High critical thinking prospective secondary teachers tended to use active and sequential learning style more than low critical thinking prospective secondary teachers and low critical thinking prospective secondary teachers tended to employ verbal learning style more than high critical thinking prospective secondary teachers.

2-1.2 CREATIVITY AND LEARNING STYLES

A few investigations have been carried out on the association of creativity and learning styles. These have been presented below:

Clark (1964) and Hamburg (1964) concluded that significant positive relation existed between creativity and preference for open structure learning.

Torrance (1976) found that creative students exhibited different learning styles than non (less) creative student.

Aggarwal (1983) reported that high creative students had preference for flexible, visual, field dependent, and environment orientated learning styles, while low creative students preferred non-flexible, aural, field-dependent, and environment free learning style.

Verma (1992) did not observe any significant relationship between students having more and less creative personality.

Verma (1993) reported that high and low creative students differed significantly on ‘meaningful orientation’ of learning and its two components (relating ideas and comprehension learning). Though they did not exhibit significant difference on reproduction orientation of learning but more fear of failure was shown by low creative students.

2-1.3 ACADEMIC ACHIEVEMENT AND LEARNING STYLES

A number of investigators have conducted studies on the relationship of achievement and learning styles using a variety of learning styles inventories. Some studies reflecting upon this aspect have been reported in the following paragraphs:
Riechmann, (1972, 1974) reported that scores on Grasha-Riechmann Student Learning Style Scales were not found to be significantly related to college grades, except a weak but significant negative relationship between avoidant learning style and grade point average and a similar but positive relationship between participant style and grade.

Schmech and Grove (1979) comparing the learning styles of 790 high and low achievers at college level found that most successful college students, were significantly higher on deep processing, elaborate processing and fact retention and lower on methodical study style.

Schmeck (1980) observed that synthesis analysis style was significantly correlated with vocabulary and comprehension but was not related to reading rate.

Murray (1980) designed a study to answer the major question; is there a difference between the learning styles of low reading achievement students and high reading achievement students? Murry also attempted to seek answer of this question: is there a difference between the learning styles of female and male low and high reading achievement students? Analysis of the data resulted in 27 significant differences between the learning styles of the various groups. It was conducted that low reading achievement subjects were more unmotivated, needed more structure and preferred to learn with an adult. His reading achievement subjects were more self-motivated, were more responsible and preferred to learn alone. The results showed that female low reading achievement subject preferred a formal room design, needed more structure, preferred a formal room design, needed more design, preferred a formal room design, needed more structure, preferred learning with an adults used visual perception more often and preferred to learn in the evening more often. Female high reading achievement subjects were more responsible and used tactile perception more often. It was also concluded that male low reading achievement subjects were more unmotivated, preferred learning with an adult more often, and preferred to learn with after-noon more often. It was inferred that male high
reading achievement subjects were more self-motivated, were more adult motivated and were more persistent.

Lesa (1981) found ‘participant’ as predominating style of American community college students. He however, did not report significant correlation between learning style and achievement.

Andrew (1981) studied the interaction effects of teaching format and student style on learning style was significantly positively related to grades of students. However, there was a weak negative relationship between avoidant learning style and grades.

Watkins and Hattie (1981) in a study of internal structure of the inventory of learning processes using 255 Australian and 173 Filipino college students reported that there were significant associations between deep processing style and college grades.

Hickerson-Roberts (1983) reported that academically successful adults showed a preference for morning scheduling of difficult tasks.

Schmeck (1983) found that deep processing elaborate processing fact retention and methodical study styles have differential validity with regard to predicting academic performance of college students.

Watkins, Hattie and Astilla (1983) found significant relationship between the inventory of learning process scales and GPA as criterion measure. They concluded that elaborative and deep processing styles were closely related to college grades.

Andrews (1984) reported that students with independent learning style outperformed students with dependent learning style in discovery learning format while reverse was true in the expository learning format.

Eylon and Reiff (1984) concluded that students with poor achievement may have acquired learning styles or strategies detrimental to their academic achievement.

Ketechun (1985) found that class rank of achievement of the students was significantly related to learning styles on Grasha-Richmann Learning Styles Scales.
Calvano (1985) designed a study to compare the learning styles of high and low mathematics achievement students to determine if significant differences exist between achievement groups in respect to environmental, emotional, sociological and physical learning style characteristics. The major finding as this study was that significant differences exist between the learning styles of high and low mathematics achievement students at middle school level. High achievement students show a stronger preference for responsibility, persistence, intake, and warmth during educational activities. Low achievement students prefer tactile learning experiences, teacher motivation, the presence of authority figure, and mobility while studying.

Gadzella et al. (1986) found that students with high GPAs obtained higher scores than students with low GPAs on deep processing and fact retention styles of learning.

The results of the study conducted by Singh (1987) indicated that high achievers show fewer preferences for intake than low achievers. Low achievers exhibited preference for early after noon frequently than high achievers for their studies.

Bhatt (1987) studied the learning style of scheduled tribe students of higher secondary class in relation to their performance in the coming examination. The subjects were asked to rate their performance/educational achievement as good, overall and poor in coming examination according to their perception. The results of the study revealed that there are no significant differences in the means of learning style scores on learning style inventory (Dunn et al. 1985) or three groups of students. From the results the investigator concluded that perception of educational achievement by tribal students is not significantly related with their learning style.

Verma and Sharma (1987) found that female students who had participant learning style scored higher in various school subjects like Hindi, English, Maths and Gen. Sciences and total course of study of as compared to their counterparts female students who had avoidant as characteristic learning style. As regard independent Vs dependent, competitive Vs collaborative learning
styles, no significant differences in achievement was observed either in school subjects or total courses of study.

Verma and Sharma (1987) in another study found that students with dependent learning style scored higher than students with independent learning style in social studies. Also students with participant learning style scored higher than students with avoidant learning style in various school subjects and in total area of studies.

Clark-Thayer (1987) found that correlation’s for both learning style and study habits and attitudes to achievement were low but significant. Further, it was found that responsibility, flexibility, not tactile and delay were the four best discriminators between successful and unsuccessful students.

Gadzella, Ginther and Hinggins (1987) found that high achievement were significantly superior to low achievers on deep processing styles. Year (1987) found that six of the learning style elements were discriminatory variables between two achievement groups. These elements were noise level, light, motivation, learning alone, peer oriented, learning in several ways and visual.

Jacobs (1987) reported that Afro-American high achievers had strong preference for teacher motivation; Afro-American average achievers had strong preferences for auditory learning and Afro-American low achievers had a strong preference for persistence.

Miller, Away and Mckinley (1987) noted that highly successful students use different learning strategies when compared with unsuccessful ones. High GPAs scored significantly greater than average and low GPAs in deep processing style.

Singh (1987) reported that high achievers showed less preference for intake than low achievers. Low achievers had shown preference for early afternoon more frequently than high achievers for their studies.

Mastern et al. (1988) found that there was a significant main effect of hemispheric learning style with that of right hemispheric learning style out performing those with integrated hemispheric learning style regarding of treatment conditions.
Bartling (1988) while investigating predictive validity of the inventory of Learning Process, noticed that there were significant correlation's between high school GPAs and all the four learning styles namely deep processing, elaborative processing, fact retention and methodical study.

Relford (1988) found that there was a significant difference in academic grades earned by learning styles with assimilator and converger.

Hayners et al. (1988) found that low achieving subjects different significantly from their average and high achieving peers on cognitive skills.

Atchinson (1988) reported a statistical significant relationship between learning styles and reading achievement.

Stahlnecker (1989) studied relationship between learning style preference of selected elementary pupils and their achievement in mathematics and reading. The results revealed that three was a significant difference in learning style preferences of the high and low achievers for both math’s and reading. Preference for 14 learning style elements in mathematics and 11 elements in reading were found to be significant predictors of achievement.

Piscopo (1989) designed a study to determine the effect of learning style preference on course performance on non-traditional students of undergraduate computer science programme. The results indicated that the differences in course grades was significant based on learning style preference.

Ettington (1989) made a comparison of learning styles of freshmen with high and low achieving groups in reading. The findings revealed that high achieving students had a preference for variety of ways, had an authority orientation and preferred more structure than low reading achievement group. It was also found that low reading achievement students were more likely to prefer visual learning.

Cook (1989) found that there was a significant difference in academic achievement in favour of a learning style group.

Hick-Rheault (1989) reported that each scale of Grasha-Riechmann’s Student Learning Style Scales was found to be related to academic achievement.
Nah-Kwi-Ok (1989) observed that GEFT and ten learning style variable of LSI showed that learning style was a good predictor of academic achievement accounting for variance in all five subjects Science, Maths, Korean language Social Studies and English.

Atwell (1989) found that learning styles as measured through Canfields’ Learning Style Inventory contribute to success of native American Students in all subject areas.

Miller et al. (1990) reported that grade for both men and women were affected by their learning styles.

Leiden et al. (1990) reported insignificant correlation between deep and surface styles and academic performance.

Tadlock (1990) found that there was significant difference between underachieving and achieving groups of 8th grade on teaching games, drill and recitation learning style dimensions. Achieving group was found to be higher than underachieving on those dimensions.

Verma and Solanki (1990) compared the learning styles of high and low achieving students of +2 level. It was found that both the groups differed significantly on flexible Vs non flexible, individualistic Vs non-individualistic, visual Vs aural, field-independent Vs field-dependent, short attention span Vs long attention span, and motivation Vs non-motivation centered learning style.

Lewis (1991) ascertained the relationship between learning styles, achievement motivation and academic performance of higher education students. The results showed that deep processing style was best discriminator between high and low achievers.

Richardson (1993) found that there was better performance of students of high achieving group in deep processing, fact retention, and methodical study when compared with their counterparts low achieving group.

Alabili (1993) reported that there were significant correlation between deep and elaborative processing styles and students’ GPAs, indicating that those two styles of learning were moderately predictive of academic performance.
**Westman (1993)** reported that deep processing style was correlated with grades in English and with study of foreign languages by senior secondary students.

**Sang-Jan (1993)** found that in distance education high GPA students scored significantly higher than low GPA students on 8 of the 10 scales of Learning Style and Study Strategy Inventory.

**Duyes (1995)** found that learning style preference measured through Kolb’s LSI were correlated with GPA.

**Jakoubek and Swenson (1995)** observed that correlated between deep processing, elaborative processing, fact retention and methodical study styles and grades were low but significant.

**Vander Stoep and Pintrich (1996)** found significant difference between high and low achievers in natural science, social science and humanities on elaboration, rehearsal also and organization learning strategies. Natural science high achievers had higher level of success on metacognitive than low achievers.

**Solomon (1996)** found that there was a weak relationship between learning styles measured by Kolb’s LSI and educational achievement of African – American entry college freshmen.

**Ungricht (1997)** did not find any significant relationship between learning styles measured through Kolb’s LSI and achievement measured by objective test and grade point average was evident.

**Verma (1997)** studied relationship between academic achievement and learning style of B.Ed. students. The results indicated that high and low achievers differed significantly on deep processing, elaborate processing and fact retention. High achievers had higher mean scores on these learning styles than the low achievers.

**Kumar (1997)** found that learning significant main effect on achievement in Biology of secondary school students. But in case of sub sample of boys no such effect was observed. Kumar (1998) found that significant main effect of only deep/surface approach on achievement of secondary school biography was observed. High mean achievement score was seen associated with deep
approach of the student. No significant main effect of organized/disorganized method of study on achieving in biology was observed.

**Markanda and Malhotra (1997)** studied the relationship of learning outcomes among adult learners as related to their learning styles. The results of the study yielded that the difference in learning styles did not make any significant difference in learning outcomes of adult learners. Hence, the research hypothesis stating that different learning styles will result in differential learning outcomes stood rejected.

**Gadzella et al. (1998)** concluded that deep processing style, methodical style and critical thinking in combined form were found to predict academic performance in forms of grades.

**Yates (1998)** found learning styles measured through Kolb’s LSI had no significant impact on academic achievement.

**Carker (1999)** observed that there was a significant positive relationship between academic success and auditory learning style.

**King (1999)** reported that significant relationships were existed between learning styles and academic success. There was a positive relationship between academic success and auditory language learning style.

**Roberts (1999)** found that significant relationship existed between learning style variable and reading, comprehension, math’s problem solving and academic competency.

**Mohanasundaram and Kumar (2000)** reported a significant relationship of right and integrated hemispheric style and achievement in history. It was noticed that right hemispheric style contributes more to the achievement than the integrated hemispheric style.

**SECTION-B**

### 2-2 PERSONALITY AND LEARNING STYLES

In this section studies showing the relationships of learning styles with personality types, traits and temperaments have been included.
Schmeck (1978) found that students engendering generally adaptive personality characteristics seemed more likely to engage in deep and elaborative processing styles.

Riding and Dyer (1980) found that introverts were more imager and extroverts were more verbalizer.

Schmeck and Spofford (1982) investigated that scores of deep processing learning style were negatively related to neuroticism dimension of personality.

West (1982) in a construct validity study, investigated the relationships between learning styles and personality characteristics. He found no significant relationship between learning styles as measured by Kolb’s LSI and personality traits as measured by the Myers-Briggs Type Indicator, Survey of Interpersonal Values and the Omnibus Personality Inventory. Of the seven factors considered significant and interpretable (e.g. social acceptability, extroversion, introversion, estheticism) from a factor analysis of the MBTI, SIV and OPI only one factor (social acceptability) was significant with one learning style.

Huelsman (1983) undertook a study to investigate the interrelationships of learning styles and some psychological types of personality. The results indicated that learning styles were significantly related to some of the Myers-Briggs Type Indicator (MBTI) variables.

The study of Pandian (1983) revealed that personality factors were related to learning styles of college students. Schmeck and Lockhart (1983) found differences in the learning styles of introverts and extroverts. Roberts (1984) reported that there were significant correlation’s between learning style and introversion/extroversion characteristics.

Petty (1985) conducted a study to determine whether an identifiable profile relating personally type, learning style and leadership exists for college student leaders. Three instruments viz. Myers-Briggs Type Indicator, Kolb’s Learning Style Inventory and Hersey and Blanchard’s Lead Self. Findings indicated that as a total group, student personality types tended to be extroverted, both sensing and intuitive thinking and judgmental. With 32%
identified as accommodators; the highest learning style inventory score was reported as abstract conceptualizers.

Davis (1985) carried out an investigation of the relationship of personality types and learning style preferences of high school students. Myers-Briggs Type Indicator (MBTI) and Learning Style Inventory (LSI) by Dunn, Dunn and Price were used to measure personality types and learning styles respectively. Results pointed out that eleven learning style elements correlated significantly with the extraversion-introversion index of MBTI; eight LSI elements correlated significantly with the judging-perceiving index of the MBTI; seven LSI elements correlated significantly with the sensing-intuition index of MBTI; five elements correlated significantly with the thinking-feeling index of the MBTI. Thus the 44 significant correlation’s in the study showed that there was linkage between personality types and learning styles.

Hinkle (1986) undertook and study of relationships among learning style preferences and personality types. The results revealed that learning styles and personality types were significantly related in the following ways: concrete experience to extraversion, reflective observation to introversion, active experimentation to extraversion; active experimentation to perceiving.

Gilchrist (1987) explored the relationship between personality orientations and learning styles of middle aged adults. The personality Orientation Inventory and Kolb’s Learning Style Inventory (LSI) were used in the study for data collection. The results revealed that no meaningful association existed between personality orientation and learning styles of middle aged adults.

Fratzke (1988) studied the relationship between learning style and personality type among traditional age college students and adult learners. This pilot study had indicated a high correlation between learning style preference and personality type among adult learners. Dominant personality types preferred converger learning styles, influence personality types preferred diverger learning styles and compliant personality types preferred assimilator learning styles.

Verma (1988) in a study reported that although extrovert and introvert types of students showed greater preference for field-independent learning style
over field-dependent learning style, extrovert type of students seemed to have relatively greater preference for field-dependent learning style as compared to their counterparts.

**Jackson (1989)** investigated the relationship between personality and learning styles of achieving gifted and underachieving gifted middle school students. The results indicated that EM, ES, IN and IS grouping provided the most significant relationship between learning styles and achieving gifted and underachieving gifted middle school students.

In a study by **Schlein-Polard (1989)** no significant relationship were identified among the critical variables – learning styles and personality types.

**Atkinson and Michael (1990)** examined the relationship between career personality types and learning styles in college students. Analysis of data pointed out that there was significant relationship between learning styles and career personality types.

**Furnham (1992)** reported that extrovert types of persons were found to be activists. i.e. concrete learners and introverts were found to be reflectors. Neurotics were found to more theorists than stables.

**Verma (1992)** investigated the relationship between creative personality and preferred learning styles. No significant relationship was found between creative personality and preferred learning styles.

**Jackobson (1993)** concluded that there was positive correlation between innovative style and extraversion type of personality.

**Donoghue (1994)** determined relationship between personality types and learning styles with Myers-Briggs Type Indicator (MBTI) and Kolb’s Learning Style Inventory (LSI). As predicted a significant relationship between LSI Converger/Diverger Style and MBTI personality type preferences for Judging/Perceiving (J/P) was demonstrated. No significant relationship was found between the converger/diverger styles and the personality preferences of Sensing/Intuitive (S/I). However, a relationship was shown to exist between Converger/Diverger styles and the combination of Intuitive Perceiving (I/P) and Sensing Judging (S/J).
Kumari Balesh (1995) carried out a study of the learning styles of socio-economically advantaged and disadvantaged adolescent students in relation to intelligence and personality types. Significant relationship appeared to exist between introvert/extrovert type personality and individualistic vs. non-individualistic learning style preference and environment oriented vs. environment free learning style preference of socio-economically advantaged group while in socio-economically disadvantaged group, this relationship did not exist. Also, there was significant relationship between stable/neurotic type personality and short attention vs. long attention span learning style preference of socio-economically advantaged and disadvantaged groups.

Fagerholm (1996) explored the nexus between learning style and personality type among adults. The Quick Word Test (QWI), Personality Profiler Survey (PPS) and Kolb Learning Styles Inventory (KLSI) were administered to the subjects for assessing verbal intelligence, personality type and learning style respectively. The results of the study indicated the strength of the relationship between personality type and learning style varied across learning style by personality type and gender. The dominance and influence types each differed from the conscientious type for the learning style processing dimension in that the dominance and influence types preferred active experimentation and the conscientious type preferred reflective observation.

Furnham (1996) explored that extraversion was found to be positively related to Activists learning style i.e. concrete learning style.

Jackson and Lauty Jones (1996) observed that extraversion was positively and significantly related to concrete/activists learning style.

Harbour (1997) studied the relation between personality type and learning styles of candidates in the external doctor of pharmacy programme. The results disclosed that no significant correlation’s by personality type and learning styles of Kolb’s LSI were noted.

Mills (1998) examined personality traits and cognitive/ learning style differences with a sample of academically talented students when compared a general population of the same age range. On the Myers-Briggs Type Indicator,
the academically talented students differed significantly from the comparison group on all four dimensions. Specifically the academically talented group expressed greater preference for introversion, intuition and thinking. Although there were more judging types in this group than in a comparison group. Overall more academically talented students expressed a preference for a perceptive style. In particular, a cognitive style that emphasize a thinking over a feeling mode appears to mediate gender differences in math ability and achievement.

Busato et al. (1999) pointed out that extraversion correlated positively with the meaning directed (MD), reproduction directed (RD), application directed (AD) learning style and undirected learning style (UD). Conscientious was associated positively with meaning oriented, reproduction oriented and application oriented and negatively with undirected learning style. Openness to experience correlated positively with the meaning oriented and application directed learning styles and negatively with the undirected learning style. Neuroticism correlated positively with undirected learning style and negatively with reproduction oriented and meaning oriented learning styles. Agreeableness was positively associated with reproduction oriented and application directed learning styles.

Golden (2001) made a canonical analysis of extroverting/introverting personality traits and reflective observation/active experimentation learning modes. The Personality Profiler Survey (Johnson & Golden, 1995) and Learning Style Inventory (Kolb, 1984) were employed in the study for collecting data from 10th grade High School students. The Learning Preference Survey developed specifically for this study, provided the third measure of student introverted and extraverted learning orientation.

The results revealed that two Personality Profiler Facet Scales talkative and Reflective Significant influenced scores on the Reflective observation scale. No significant relationships were found to exist between the facet scale and Active Experimentation Mode.

Golden (2001) investigated the relationship of learning styles with personality type. The results of the study revealed that two personality Profiler
Facet Scales–Talkative and Reflective significantly influenced scores on Reflective Observation Scale of Kolb’s Learning Style Inventory. However, no significant relationships were found to exist between the Facet Scale and Active Experimentation Mode.

Singh, Renu (2001) found that extravert boys and girls were similar in their preferences for learning styles. At average extravert level, boys were found to be individualistic whereas girls were non-individualistic in their learning styles. (2) The introvert boys were found to be more individualistic and less environment oriented than the introvert type girls. The introvert boys appeared to have long attention span and introvert girls reflected short attention span learning style. (3) At high neurotic and average neurotic level, the boys were individualistic and girls were non-individualistic. (4) Stable girls were found to have short attention span and stable boys to have long attention span learning style. Stable girls also appeared higher in visual learning style than stable boys.

Vandana (2004) found that learning style preferences were significantly related to personality types of prospective secondary teachers. The results revealed that:

(1) Prospective secondary teachers of extroversion type personality seemed to be more inclined toward the use of active learning style than prospective secondary teachers of introversion type personality whereas prospective secondary teachers of introversion type personality seemed to be more prone toward reflective and global learning styles than prospective secondary teachers of extroversion type of personality. (2) On global learning style, prospective secondary teachers of intuition type personality were higher than prospective secondary teachers of sensing type personality. (3) Thinking type personality prospective secondary teachers seemed to score higher on visual learning style whereas feeling type personality prospective secondary teachers were higher on global learning style. (4) Prospective secondary teachers with judgement type personality had stronger preference for visual learning styles while perceptual type personality prospective secondary teachers had more preference for reflective, intuition and global learning style.
2-3  SELECTED PERSONALITY FACTORS AND LEARNING STYLES

Section deals with researches concerning relationship of learning styles and locus of control and learning styles and self-concept.

2-3.1 LOCUS OF CONTROL AND LEARNING STYLES

Stewart (1979) designed a study to investigate the difference in preferred learning styles between gifted/talented students and students of general population. He further examined the factors, which influence learning style performance and relationship of some variable with learning style. He found locus of control variable was significantly related with learning style preferences.

Murphy (1980) found that there were relationships between learning style, perceptual style and locus of control depending upon age, position, specially and degree.

Verma (1996) reported that university students having high, average and low levels of locus of control did not reveal any significant difference in mean scores of learning styles as measured by Kolb’s Learning Style Inventory.

Smalarz (1988) undertook a study to determine whether differences exist in learning style and locus of control of adult women enrolled in two different programme in an institution of higher education. The findings indicated that a marginal relationship seemed to exist between internal locus of control and the assimilator style of Kolb’s LSI.

2-3.2 SELF CONCEPT AND LEARNING STYLES

Hoffman (1979) found that field-dependent cognitive learning style was related to self-concept of sixth grade boys. In this study cognitive learning style was measured through Group Embedded Figure Test.

Bhatt (1987) made an attempt to a study of learning style, self-concept, socio-economic status and performance of scheduled tribe students of Higher
Secondary Class. The results of the study revealed that there was a positive and significant relationship between self-concept and learning style as measured through Learning Inventory by Dunn et al. (1985).

(SECTION-D)

2-4 MOTIVATION AND LEARNING STYLES

In this chapter research studies focuses on motivation and learning styles. It includes motivation factors like, self-actualization, achievement motivation, needs and anxiety.

2-4.1 SELF-ACTUALIZATION

Verma (1996) undertook a study to explore the effects of personality and motivation on learning styles of university students. Learning styles were assessed by Kolb’s learning Style Inventory and Self-Actualization by Jones and Crandall (1986). The results showed no significant difference in learning modes and learning styles of students having high, medium and low levels of self-actualization.

2-4.2 ACHIEVEMENT MOTIVATION AND LEARNING STYLE

Schmeck and Ribich (1978) observed that the deep processing style was positively related to both independent and confirming achievement starving behaviours and students with highest level of elaborative processing style scored highest on academic curiosity. The findings also revealed that this high on fact retention style and methodical style preferred to achieve by conforming only.

Ismail (1982) examined the relationship between achievement motivation and learning style as measured by Mehrabian and Bank’s measures of achieving tendency and Kolb’s learning style inventory respectively. The study was conducted on Malasian students attending Illinois university. The results disclosed that correlation’s between achievement motivation and each of the
learning style sub scales ranged from .35 to .44. It was concluded that motive to avoid failure was related to concrete learning.

The motive to achieve success was related to abstract learning. Achievement motivation was found to be independent of the dominant learning style preferences. Academic major group and level of schooling were significant factors in correlating achievement motivation with learning style.

Verma (1996) conducted a study on the relationship of personality and achievement motivation with learning styles of post graduate students. In this study achievement motivation was measured by Helmreich and Spence and achievement motivation scale and learning styles Kolb’s learning style inventory. The findings revealed that achievement motivation was not found to be a significant factor in concrete experience, abstract conceptualization, active experimentation, diverger, converger, assimilator, accommodator learning styles. However, reflective observation was found to be significantly influenced by achievement motivation. Highly achievement motivated demonstrated more preference for this mode than students having average and low level of achievement motivation.

Busato et al. (1999) observed that there was positive correlation for achievement motivation with meaning oriented reproduction oriented and application directed and negative one with undirected learning style.

2-4.3 ANXIETY AND LEARNING STYLES

Ismail (1982) found that motive to avoid failure was related to concrete mode of learning on kolb learning style.

Hinkle (1986) investigated the relationship among learning style preferences, personality types and mathematics anxiety of college students. Kolb’s learning inventory was used to measured learning styles. The findings indicated that mathematics anxiety was significantly correlated to reflective observation and negatively to concrete experience.

Verma (1989) reported that trait anxiety and learning style preferences were significantly related in case of motivation centred Vs motivation non-centred
learning style. Although both anxiety group (high low) showed their preference for motivation centred style, the low anxiety students appeared to have relatively more preference for motivation centred learning style.

**Dyers (1995)** examined the association between communication apprehension and learning style preference of freshmen and undergraduate students. The results indicated that trait communication apprehension was significantly correlated with learning preference for women, but not for men, highly communication apprehensive women preferred a learning style of RO and thoughtful evaluation or guided active experiment and practical application. Further, context based communication apprehension was significantly correlated with learning style preference for women, but not for men.

**Onwuebuzie (1997)** investigated the relationship between learning style and research anxiety in research methodology course. The analysis revealed that teachers with highest level of research anxiety tended to prefer informal classroom designs and material presented in a structured manners. In addition, they tended to be peer oriented and non-authority oriented learners who require mobility in learning environment.

**Kelley (2004)** found that there was no significant relationship between anxiety level and perceptual learning styles.

**Kumar (2006)** reported that secondary students with low level of anxiety were found to be higher on imaginative, analytical and precision learning styles than students on high anxiety.

**2-4.4 STRESS AND LEARNING STYLES**

**Gadzella et al. (1998)** investigated the relationship between stress scores and learning strategies/styles of university undergraduate students. Student life stress inventory (Gadzella,1991,94) and inventory of learning processes (Schmeck et al.) were found for assessment of stress and learning strategies/styles.

The data analysis indicated that (a) there was a significant positive correlation between cognitive appraisal (reaction to stressors) and elaborative
strategy/style (b) Significant negative correlation between frustration (stressors) and deep processing strategy/style (c) conflict and self imposed (stressors) and emotional (reaction to stressors) with methodical study strategies/style.

2-4.5 NEEDS AND LEARNING STYLES

Feiza (1988) explored the relationship of motivational differences of undergraduate college students with their four learning styles. Motivational profile developed from Murrays 28 psychological needs and Gregore Style Delineator were used as tools for data collection. After factor analysis of motivational profile, three major factors emerged- self –centered needs, social needs, and achievement needs. Results of the study indicated that Abstract Random and Concrete Random learning style groups differed significantly with regard to self -centered and social needs.

2-4.6 LEARNING ENVIRONMENT AND LEARNING STYLES

Agce (1989) included that there was no significant relationship between learning style and perception of the learning environment.

Okanlawan (1989) reported that some of the learning environment were perceived differently by individuals having four learning styles.

2-4.7 CAREER CHOICE AND LEARNING STYLES

Gilchrist (1987) inquired into the relationship between middle aged adults career interest and their learning styles and personality orientation. Kolb’s Learning Styles Inventory, Career Occupational Preference system. Interest inventory and personality interests inventory was employed on middle aged adults. The finding indicated no meaningful relationship existed between career interest and learning style.

Okanlawon (1989) found that there was no significant support for the hypothesized relationship between learning style and career choice or academic specialization.
Reistroffer (1997) studied the relationship between individual learning style and career choices among traditional and non-traditional theological students. The results revealed that there was no statistical significant correlation between career choice and learning style.

(SECTION-E)

2-5 DEMOGRAPHIC/BACKGROUND FACTORS AND LEARNING STYLES

In this section studies pertaining to the relationship of learning styles with demographic and background factors are given. These include, gender, age, races/ethnicity, SES, residence locality, subject/stream and institution types.

2-5.1 GENDER AND LEARNING STYLES

Caskey (1981) did not find significant sex differences in learning styles of community college students as measured by Kolb’s Learning Inventory.

Agarwal (1982) investigated the learning style preferences of secondary students in relation to sex. The data analysis revealed that sex differences were found in case of visual versus aural learning style. Boys exhibited their preferences for visual learning style while girls preferred aural learning style.

Tucker (1983) attempted to determine if any significance’s existed in the learning styles of selected eight grade students using Kolb’s LSI. The Data analysis revealed that the participants as group preferred active experimentation over reflective observation and concrete experience over abstract conceptualization. Further, boys scored significantly higher than girls on the abstract conceptualization scale. The data further revealed that a significant differences between the sexes on AC-CE combination scale. The males showed preference for abstract over concrete abilities while the females showed preference for concrete over abstract abilities.

Bishop (1985) studied learning styles of women students. The results showed that the women were concrete experiential and active experiencing learners with an accommodator mode of learning. Study further revealed that the
women scored significantly higher on the concrete experiencing scale of Kolb’s LSI than the women and men in other liberal arts colleges. Women scored significantly lower on the abstract conceptualization scale and higher on active experimentation scale than did the men.

Davis (1985) focused upon the study of the relationship of gender and learning styles. The investigator found that gender correlated significantly with the LSI elements of temperature, design, motivation, visual learning, tactile learning and learning in the afternoon.

Grun (1986) investigated the proposition that individuals have distinct learning styles and these learning style influence academic performance. Kolb’s ‘Learning Style Inventory’ was used for collection of the data. No significant relationship was found between learning styles and sex.

Kirk (1986) conducted a study to assess learning and cognitive development of adult students in higher education setting. The findings disclosed that gender was not significantly related to learning style preference.

Keir (1987) found that no support could be given to the relationship between learning style and gender.

Balesh Kumari and Verma (1988) examined the learning style preferences of senior secondary students in relation to their gender. The outcome of the study exposed that there were gender differences in case of three sets of the learning styles. Male students exhibited stronger preferences for individualistic learning style while female students demonstrated more preference for field-independent and environment oriented learning styles. No sex differences were observed with regard to the other learning styles. The investigators concluded that gender differences are partly related with learning styles preferences.

Kozminsky (1988) found that factor analysis of the inventory of learning processes (ILP) scales from undergraduate students revealed no sex differences.

Ginther et al. (1989) explored that perceptual learning styles (print, visual, interactive, split) did not differ for sex.
Titus Thomas, Bengandi and Mansha (1990) reported that female adolescents were more concretely oriented. They also found that slow learners were more reflective, more active and less abstract.

Joerger (1992) reported that male students who as a Group were assimilators, preferred to use their abstract conceptualization to a greater degree than did the female who as a Group were diverger. However the technical college female were accommodators. The male and female technical college and community college instructors were accommodators. In this study Kolb’s LSI was used to gather the data.

Mccoun (1993) undertook a study to find out if gender differences existed in the non-remedial and general population and in the remedial mathematics population. The results disclosed that females scored significantly higher on the Reflective Observation mode of Kolb’s Learning Style Inventory.

Lucy (1993) in a study of distance education programme concluded that male subjects consistently preferred an abstract conceptualization learning modality. A concrete experience learning orientation was significantly associated with being female.

Flores-Feist (1995) reported that there was significantly difference on Kolb’s learning style between male and female in chemistry.

McKee (1995) in an exploratory study of learning styles of college students found that there was statistical significant relationship between learning style preference on Kolb’s LSI and gender of students.

Philbin and Meier (1995) investigated that significant difference existed in learning styles between men and women. Men scored to find congruence between tradition education and their learning styles, as it is abstract and reflective while women learned better in hand-on-and practical setting.

Verma (1995) found that male and female students did not exhibit any significant difference in any of the learning styles i.e. deep processing, elaborate processing, fact retention and methodical study.

Powe (1996) undertook a study to describe the relationships between learning styles and demographic characteristics of students registered nurse and
certified registered nurse instructors. The findings disclosed that no statistically significant relationship was identified between learning styles measured by Kolb’s learning style inventory and gender for both the students and instructors.

**Harbour (1997)** observed that males were more thinking and judging, consciousness orientated and females were more balanced evenly the categories except for learning styles where the females were dominantly assimilator oriented.

**Reistroffer (1997)** reported that there was no statistical significant difference in learning style score for men women on Kolb’s learning style inventory.

**Gallagher (1998)** examined the gender differences in adults and traditional age students learning styles at selected universities. The data on learning style were collected by administering Kolb’s Learning Style Inventory. Statistically significant differences were found through chi-square analysis in learning styles of men and women students.

**Nuby and Oxford (1998)** highlighted that male and female’s preference patterns were (extraverted, sensing, thinking and perceiving) in broad sense but percentages were different, particularly on thinking-feeling styles.

**Whitcomb (1999)** in a study found that there were significantly gender differences in learning style preferences with men being more abstract, while women preferred more concreteness.

**Truluck and Courtenay (1999)** observed no gender differences in learning styles of older adults. Both males and females adopted the similar styles in learning.

**Fandelova (1999)** showed that women possessed a more active learning style compared to men.

**Hansen (2000)** reported significant gender differences in learning styles. This indicates that learning style preferences differed between male and female certified athletic trainers. Male certified athletic trainers preferred the assimilator and converger learning styles. Whereas female certified athletic trainers preferred the converger and accommodator learning style. However, those were
statistically significant relationship between student athletic trainers gender and learning styles.

Williams (2001) in a study of learning styles and achievement motivation of community college students found that there was no significantly differences were noted, however, in the learning mode characteristics between men and women students.

Lim Yuen Lie and Lisa-Angelique (2004) reported that males scored slightly higher than females on deep strategies of learning styles as measured through Biggs’ SLQ.

2-5.2 AGE AND LEARNING STYLES

Caskey (1981) studied the cognitive learning styles of community college students using Kolb’s Learning Style Inventory. The findings revealed that age factor did not differentiate the learning styles of such students.

Phillips (1982) found that there were marked differences between the older and younger students with respect to learning preferences on Kolb’s LSI.

Rush (1983) made a comparative study of learning style and related factors between traditional and non-traditional students at the university of Akron. The results revealed that there was a significant difference in the two groups (925 years of age and students over 50 years of age) on learning styles measured by Kolb’s LSI.

Fagersholm (1986) indicated that no age related difference in Kolb’s learning style was found.

Grun (1986) observed that some relationships were found between learning styles and age of the students.

Kirk (1986) found that age was found to be related to learning style preferences as measured through Kolb’s Learning Style Inventory.

Keir (1987) found that age was not related to Kolb’s learning styles of the participant.

Delargy (1991) investigated the relationship among age, gender and learning styles as measured by Kolb’s Learning Style Inventory. Analysis
revealed a significant main effect for age on AC scale. With the older group being more abstract conceptualizers than the younger. Significant interaction between age and gender were revealed on RO, AC, AE and AE-RO scales LSI. Younger females scored higher in active experimentation. Younger males and older females scored higher on reflective observation than younger females and older males. Older females were significantly more abstract than the younger females who scored higher than other group on concrete experience. The higher LSI scale score correlation’s for the older group scores followed Kolb’s predictions and were between CE and AC and between AE and RO. With the younger group (<=55 years. The higher negative correlation did not follow Kolb’s predictions. Instead they were between AC and AE between CE and RO.

Clerce (1995) did not find any significant difference between traditional students (aged 25) and non-tradition of students (older than 25 years) learning style measured through Kolb’s Learning Style Inventory.

Mckee (1995) found that there was statistical significant relationship between age and learning styles on Kolb’s learning styles inventory.

Powe (1996) found no statistical significant difference in learning styles based on age variability.

Gallagher (1998) investigated the differences in learning styles measured by Kolb’s LSI in adults and traditional age students’ learning styles at selected universities.

Whitcomb (1999) undertook a study to examine the relationship of cognitive development to learning style preferences of college students. Learning Style Preferences were determined by Kolb’s Learning Style Inventory (LSI). Results showed significant difference between age groupings with younger students being more reflective, while the older students were more active in their learning process.

Ginsberg (2002) made an analysis of learning styles among young old adults (aged 65-74) and old adults (aged 75-99). On Kolb’s Learning Styles Inventory, the results revealed that predominant learning styles among older adults assimilators and divergers and five of the ten participants demonstrated
use of more than one learning style. These were no differences in age groups and learning styles.

2-5.3 SOCIO-ECONOMIC STATUS AND LEARNING STYLES

This section provides the review of research showing the relationship between socio-economic status and learning style.

Witten Berg (1984) calculated that socio-economic status was not found as a significant factor in learning style of the students when Dunn et al;'s learning style inventory was used for diagnosis of learning style.

Simmons (1986) did not find significant relationship between socio-economic status and learning modality styles.

Singh (1987) reported that advantaged students liked to have quiet atmosphere, Bright Light, and cool temperature. They were motivated by themselves and by adults. They showed persistence and responsibility and were clear about their option. They generally preferred to study in pairs but other social groups were also liked by them. They liked to have kinesthetic and auditory experience. They preferred to study in the morning time.

On the other hand, the disadvantaged students like to study in quiet atmosphere and cool temperature. They had preference for formal design. They found inspiration from themselves and adult. They exhibited persistence and responsibility. They were clear about their options. Most of them preferred to study in pairs. Kinesthetic experience played an important role in their life. Morning was the most preferred time for studies.

Verma and Sheikh (1992) found that socio-economically advantaged studies exhibited stronger preference for independent learning style while disadvantaged students had more inclination towards dependent learning style.

The advantaged student had upper position on participant on collaborative, dependent and avoidant learning style. As compared to these students, disadvantaged students had superior position on participant dependent and competitive learning styles and lower position on collaborative, independent and avoidant learning styles.
Further, advantaged students showed more preference for independent learning style and participant learning style were dependent and avoidant learning styles respectively. The disadvantaged students on the other hand, had more preference for dependent learning style and avoidant learning styles respectively.

Harrigan (1993) found that socio-economic status was one of the factors which moderated the influence of matching learning style preference to complementary treatment on academic performance.

2-5.4 SUBJECT/STREAM AND LEARNING STYLES

Tamir (1975) concluded that cognitive style preference is at least partially discipline and subject matter dependent. Students’ cognitive styles for Biology and Chemistry were found different.

Plovnick (1975) reported that different types of choice of specially of medical students were found to be associated with different learning styles as measured through Kolb’s Learning Style Inventory.

Friedman and Stritter (1977) found significant differences in instructional preferences of medical and business students.

Grasha (1979) reported that the learning style profile of students in the areas of Psychology, Education, Physics, Mathematics, Chemistry, History, English, Engineering, Philosophy and Political Science were not found to be significantly different at college level.

Copenhaver (1979) observed that a wide range of learning styles exist in each subject area.

Stewart (1979) observed that favourite subjects affected learning style preferences of the students.

White (1979) reported that there existed disciplinary differences in learning styles of technical education students. Students of associate degree law enforcement and secretarial science showed differences in their preferences for learning styles.
Miller (1979) reported that the engineers were perceived to be more relevant on abstract and reflective skills than those in a subsequent management positions.

Grasha (1979) reported that learning style profile of students in the subject area of psychology education Physics, Maths, Chemistry, History, English, Engineering, Philosophy and Political Science were not found to be significantly different at college level.

Kolb (1981) found that undergraduate Business majors tended to have accommodative learning styles, Engineering majors tended to have convergent styles and History, English, Political Science, Psychology, Economics and Sociology majors tended to have assimilative styles. Physics majors were very abstracts and tended to have either convergent or assimilative styles.

Watkins and Hattie (1981, 1982) reported that arts students scored higher than basic science students on deep processing and elaborating processing styles.

Caskey (1981) investigated the effects of attribute variables of community college students on cognitive learning styles measured by Kolb's Learning Styles. Selection of College major significantly affected both the abstract/concrete and active/reflective dimensions of cognitive learning style. Architecture/Engineering majors tend to be abstract learners while business major prefer an active learning style.

Gypen (1981) studied the learning styles of engineers and social workers and found that as engineers move up from the bench to a management position, they complement their initial strengths in abstract conceptualization and active experimentation with the previously non-dominant orientation of concrete experience and reflective observation. As social workers move from direct service into administrating position, they move in the opposite direction of the engineers.

Dunn (1982) found that the mean performance of educators preferred learning styles were significantly different from those of business professionals. Learning styles were assessed by Kolb's Learning Styles Inventory.
Heikkinen et al. (1982) reported physical education and vocational education majors differed significantly from other subject matter majors by preferring to work with things i.e. equipment, working models, classroom materials over working with people, numbers and language according to Canfield’s LSI.

Raina and Vats (1983) found that arts students had relatively higher scores on right hemispheric style of learning in comparison to science students, although difference in mean scores were not significant.

Katz (1983) examined the cognitive learning styles of architects, scientists and mathematicians. Results revealed that each profession demanded a significant contribution from each style i.e. right and left hemispheric styles.

Entwistle and Ramsdane (1983) found the evidence concerning differences in preferred learning styles between students in contrasting academic disciplines. Science students were observed more serialistic and arts students more holistic.

Pandian (1983) reported that learning styles measured through Grasha-Richmann’s Learning Styles Scales were not found to be significantly related to stream/subjects.

Zakrajesh et al. (1984) reported that on Kolb’s LSI no significant differences in preferred learning styles were found between academic major (Physical Edu. And Dance).

Kumar (1984) found significant differences in cognitive styles of postgraduate students of different streams. Students belonging to science and math’s stream were observed to be more field-independent than arts and commerce students.

Using Kolb’s Learning Styles Inventory (LSI) Biber and Buchanan (1986) surveyed accounting economics/finance management and marketing major who were well classified under the universal grouping of the business school. Their results suggested that the economics/finance majors scored significantly different from accounting students on Kolb’s Learning Styles Inventory who scored similarly to science majors. The researchers also found that management and
marketing major scored in the same range as the humanities and applied majors rather than grouping several areas of study under large generalized headings.

Grun (1986) found that certain learning styles of Kolb were found to be associated with specific academic major.

Kirk (1986) found that learning styles Kolb’s Learning Styles Inventory was not found to be significantly related to academic major/minor.

Taylor (1986) investigated in the relationship of brain dominance and learning style preference to student schusses. Learning styles were identified by Kolb’s Learning Styles Inventory. The findings indicated that students choice of major was not related to learning style preference of students.

Rai and Prakash (1987) found that cognitive style differences were linked with educational stream choice. Brown and Burke (1987) found significant differences in learning style preference for students of different majors.

Rogers and Palmers (1987) observed that students interested in the business majors tended to fall in low learning oriented and low grade oriented or low learning oriented and high grade oriented styles; potential educational majors were most likely to be low learning oriented and high grade oriented students interested in the social and behavioural sciences had a slight tendency toward the high learning oriented and high grade oriented learning style group.

Rogers et al. (1988) concluded that significant differences in learning orientation scores were observed from different major field; highest learning orientation were reported by students of humanities and arts while lowest learning orientation scores were reported by General Studies and Business undergraduate students.

Verma and Kumari (1988-90) found that significant relationship existed between academic stream and learning style. Science and arts students showed significant differences in field-dependent/field-independent, motivation centred/motivation non-centred learning styles.

There were significant differences between students of science and commerce streams in field-dependent/field independent and short attention
span/long attention span learning styles. But no significant differences were observed between arts commerce students in any learning style.

Kozminsky (1988) found that there were statistical significant differences in learning styles of students based on areas of study. The deep processing mean for basic science groups. On elaborative style the human services mean was higher than the other two groups.

Smalarz (1988) found that a marginal relationship seemed to exist between the assimilator style and the nursing major.

Reading, Brown and Hayden (1989) using Kolb’s Learning Styles Inventory (LSI) compared the learning styles of students of similar majors who were enrolled in courses at the liberal arts college with their cohorts attending a college with a decidedly technical focus. Even though the students major were significant differences between their learning styles.

Winant (1989) found that dominant learning style preferences of engineering faculty were assimilator and converger, although all four learning styles were present. Student in both of campus and on campus were predominantly convergers and assimilator in their learning styles.

Raina (1990) reported that B.Ed. students of science and language differed significantly with regard to their syllabus boundness and syllabus free study style.

Monfort (1990) reported that students majority in Advertising, Interior, Design, Music, Journalism, Art Oral Communication and Architecture suggested a preference for right brain dominated learning styles while scores of students majority in Accounting, Management, Finance, computer Science, Mathematics, Nursing, Criminal Justice, and Elementary Education suggested preference for left brain dominated learning style.

Lavach (1991) found that subjects of humanity had preference for right hemispheric style of learning; Yuen (1994) reported that significant difference in learning styles across different faculties. In contrast, natural science students appeared to prefer a more integrated or left hemispheric style, a style evident for students of social science as well.
Banks (1991) undertook a study to determine whether there is a preferred learning style of software engineering Kolb’s Learning Styles Inventory. Honey and Mumford’s Learning Style Questionnaire. The results of the study clearly indicated that there was a demonstrated preferred learning style and a least preferred learning style. Results from Kolb’s LSI-II indicated a strong preference for the converger and assimilator learning styles. These two learning styles show a common learning mode of abstract conceptualization. Result from LSQ indicate a strong preference for reflector learning style.

Owens (1993) found that teachers of various subjects showed differences in learning styles preferences. Secondary humanities teachers were strongly inclined towards cooperative learning, in contrast, science and mathematics teachers were tended to have higher scores on competitive learning style.

Chi-Ching (1994) found that students studying different subjects were for most part in association with various learning styles as hypothesized by Kolb.

Hays and Richardson (1995) reported that students taking science course obtained higher mean scores on reproducing orientation learning than those taking arts course. But there was no difference in meaning orientation learning between the students of two types of course.

Srivastava (1995) reported that science and arts students exhibited significant difference in their cognitive style. Biology and Math’s students were significantly more field-independent than commerce and arts students. There was, however, no significant difference in cognitive style scores on biology and math’s students, and the commerce and arts students. A study by Lonka and

Mckee (1995) undertook a study to ascertain the relationship of learning style with academic achievement, academic major and demographic variability using Kolb’s Learning Styles Inventory. The findings indicated that a statistical significant relationship was found between learning style preference and academic major, but not in the direction hypothesis based on previous research. The relationship between the preference for abstraction scale and academic major was statistically significant.
Verma and Kumar (1996) found that science women students showed superiority over arts students with reference to independent, dependent, competitive, collaborative and participant learning style. On the other hand, arts women students with regard to avoidant learning style.

Wilcoxen and Prosesr (1996) found that arts students scored higher mean scores on concrete experience and science students scored higher on active experimentation dimension of learning styles.

Gallagher (1998) reported no significant relationship of learning styles as measured by Kolb’s to academic major.

Misra (1998) reported that in general students belonging to commerce, management and fine arts mostly prefer right hemispheric style. On contrary, students belonging to arts prefer to left hemispheric style of learning. Science students, however, had been found to use left and right hemispheric styles of learning.

Shaw (1999) reported that university students discipline areas had little significant effect on their learning style preferences measured though Dunns’s LSI.

Slaats et al. (1999) reported that there were strong difference between students in different disciplines on vocational study. One learning style was found more often for each disciplines.

Vermetten, Lodewijks and Vermunt (1999) found that significant differences existed between students of private law, introduction to law, criminal law and administrative law on relating and structuring, analyzing, concrete processing, self-regulation, external regulation and lack of regulation.

Sood (2000) reported that women student of arts stream appeared to have higher level of avoidant learning style than women students of science stream.

Jones (2000) conducted a study to determine whether learning styles of college students vary across four subject areas, disciplines, English, Maths, Science and Social Studies using Kolb’s modified learning style inventory. The
results revealed statistically significant differences in the student learning preferences by subject area.

2-5.5 RACE/ETHNICITY AND LEARNING STYLES

Caskey (1981) reported that learning styles on Kolb’s KSI in community college students were not found to be significantly influenced by ethnicity variables.

Tucker (1983) using Kolb’s Learning Styles Inventory found no significant difference between black participants and white participants existed with regard to learning style of eight grade students.

Johnson (1989) made a comparative analysis of learning styles of black and white college Freshmen. On Kolb’s Learning Styles Inventory, blacks as a group used the assimilator mode of processing information as compared to whites who used the diverger learning modality to a great extent.

Flores-Fist (1995) reported that there was a significant difference in learning styles between Hispanic and Anglo students in chemistry as measured by Kolb’s LSI.

Aragon (1996) reported that several significant differences were found between native American and Hispanic adults learners using nine instruments for assessing learning styles and cognitive styles including Kolb’s Learning Styles Inventory. Gallagher (1998) explored the differences in learning styles using Kolb’s Learning Styles Inventory in adult and traditional age students styles at selected universities. Ethnicity did not emerge as significant factor with reference to differences in learning styles.

Williams (2001) reported that there were no significant differences in learning styles of men and women community college students when learning styles were assessed by Kolb’s Learning Styles Inventory. The difference between race/ethnicity categories however, were noted in learning mode characteristics.
2-5.6 TYPES OF INSTITUTION AND LEARNING STYLES

Some researchers in foreign countries and India have studied learning styles of students of different types of institutions. Available researcher have been reviewed here:

Tamir (1975) reported that significant differences were found in cognitive preferences of students of different types of schools-city schools and agricultural schools.

Grasha (1979) found notable differences between two and four year college students. Tow-year college students tended to adopt more dependent, more competitive and more participant student roles than do students in four year institutions.

Ghosh and Massey (1979) reported that students studying in different types of schools show significant differences in their cognitive style.

Pushpavathamma (1980) fund that private and semi-urban school children were more field-independent in their cognitive style while aided schools were least field independent.

Agarwal (1982) reported that preferred learning styles of public school student were flexible motivation-centred, environment oriented, individualistic, field-dependent, long attention span, and aural. Preferred learning style of central school students were flexibility oriented, motivation centred, field-dependent, individualistic, aural and long attention span. These preferences are in rank order for both the groups. Although both school students preferred motivation centred learning style, percentage of students preferring motivation centred learning style in public schools was significantly higher as compared with central schools.

Ramsden (1983) studied institutional variations in British students’ approaches to learning. The results were contrary to the expectation. The university group was likely than the polytechnic group to use deep approaches to learning. Both the group reported similar patterns of study organization.

Campbell (1984) reported that there were institutional differences in learning styles of nursing students.
Newble and Clark (1986) reported that the results showed marked differences in learning approaches of students in traditional and innovative medical school. The innovative school was higher on deep approach and lower on surface approach than the traditional school.

Johanson (1987) found that there were no significant differences in learning styles of public and private institutions.

Jackman (1987) observed that there were significant differences in learning styles of home economics undergraduates enrolled in different types of institutions.

Weasel (1989) reported that learning style preference of the students were found to be dependent on type of institution i.e. college and university.

Monfort et al. (1990) found that there was significant difference in learning style preferred of students belonging to different types of colleges. (Education, Business, Arts, Mathematics, and Science, Special Arts and Science Architecture).

Misra and Tiwari (1992) observed that boys coming from superior schools were more field-independent than boys from inferior schools. But such difference was not evident in case of girls.

Vinod and Kadlaskar (1995) found that the difference in environment of three schools was reflected in learning styles of the students. The girls of gifted school showed significantly right hemispheric style and integrative style whereas girls from unselected schools (B&C) showed preference for left hemispheric styles.

Verma (1996) found that adolescents studying in convent public schools differed significantly from adolescents studying in government schools with regard to their learning styles. Students belonging to former type of institution had stronger preference for short attention span over long attention span. Further, students of government schools had similar preference for short and long attention span based learning styles.

Verma and Kumar (1996) reported that women students of privately managed institutions were significantly more inclined towards independent and
avoidant learning styles. However, both group were found to be similar with regard to dependent, competitive, collaborative and participant learning styles.

Jangiah (1998) reported that the type of school had significant influence on cognitive learning style of primary school children.

Mohanasundaram and Kumar (2000) found that there was no significant association between management of schools and style of learning and thinking. Students of government schools and private schools did not differ significant in either of the three styles of learning and thinking, viz., right hemispheric, left hemispheric and integrated.

Similar inference was drawn with regard to co-educational and non-coeducational institutions on learning and thinking styles.

Sood (2000) reported that women students of government and public senior secondary schools did not exhibit any significant difference in collaborative, participant and competitive learning styles. However, women students of public schools were found to be higher on independent, dependent and avoidant learning styles than women students of govt. schools.

2-5.7 RESIDENTIAL BACKGROUND AND LEARNING STYLES

A little amount of research is available on the relationship of residential background and learning styles of senior secondary students. As regards learning style of women students there is a dearth of the investigations. Some studies dealing with association between residential background and learning/cognitive styles have been reported in this section.

Das and Panda (1977) found that students belonging to rural area were significantly different from the students of urban area in cognitive style. Rural students were observed to exhibit more filed-dependence in their cognitive style than their urban counterparts.

Ram (1981) did not notice any significant difference in cognitive style of rural and urban students.
Sharma and Ahuja (1982) also did not find any significant difference between rural-urban habitats on field dependence/field independence dimension of cognitive style.

Chaterjea and Paul (1982) reported significant influence of rural urban background on students’ cognitive style. Urban students were found to have more field-independence than rural students.

Tappenden (1983) observed that rural and urban subjects differed significantly on 8 out of 2 learning style elementary inventory. Further, rural and suburban students exhibited significant differences on five learning style variables.

Clyne (1984) found that there were significant differences in learning style preference of native and urban students of grades 4 to 6. The investigator concluded that acculturation may modify preferred learning styles of the students.

Deb (1987) reported that rural students were more field-independent in their cognitive style than urban students.

Keir (1987) found that the data did not provide support to the relationship of learning style and place of residence of students.

Atchison (1988) found that statistically significant relationship existed between the learning style and rural urban location.

Nah (1988) reported that learning style differences existed between rural and urban learners. Urban students were found to be more field independent in their cognitive style than rural students. The former group of students was noticed to be more efficient in cognitive differentiation tasks and less sensitive to the external environment than their rural counterparts.

Verma (1991-92) studied the relationship between rural/urban residential background and learning style preferences of students. The analysis of the data revealed that learning style preference of girl students were significantly related to their residential background in two out of the seven sets of learning styles on Agarwal’s Learning Style Inventory.

Misra and Tiwari (1992) observed that there was significant influence of rural-urban background on students’ cognitive style. Urban students showed
more field-independence and rural exhibited more field-dependence in their cognitive style.

Verma (1994) found that subject with rural urban backgrounds did not exhibit any significant difference with regard to hemisphericity based styles.

Verma and Ramesh (1996) reported that urban women students appeared to have greater magnitude of avoidant learning styles in comparison to rural women students.

Sangita (1997) found that there were no significant differences in learning styles preferences of gifted high school students studying in rural and urban schools with regard to six sets of learning styles. Urban school students, however, showed their preference for individualistic learning style while rural school students demonstrated preference for non-individualistic learning style.

Mohanasundaram and Kumar (2000) reported that there was an association between style of learning/thinking and locality of the students. Urban students were found to have right hemispheric dominance and rural students left hemispheric dominance. In other words, urban students were higher on right hemispheric style of learning and thinking and rural students were higher on left hemispheric style of learning and thinking.

(SECTION–E)

2-6 EMERGING TRENDS : CONCLUSIONS

It is quite clear from the review of the related research that investigation have been carried out on learning styles in India and abroad to explore their relationships with cognitive factor such as intelligence, critical thinking, creativity, academic achievement and non-cognitive variables like personality, personality factors (locus of control, self-concept, motivation, anxiety stress, needs), environment and career choice etc. But on stress and learning style only one study seems to have been conducted. In this study too Kolb’s learning style inventory has not been used. Regarding motivation, it may be said that only a few studies focussed on the relationship of achievement motivation and Kolb’s
learning styles. In none of the studies a measure of academic motivation has been used.

In non-cognitive factors, demographics also come. In this category, sex, age (personal variable) subject/stream (contextual variable), race/ethnicity, SES type of institution and rural/urban background have been explored in context of learning styles. This is vividly clear that educational disadvantage factor, representation of educational disadvantaged has not been undertaken so far by any researcher to examine its effect on learning styles. Therefore, it gave hint to select the problem of the study from this unexplored area. In India educational disadvantage is an integral part of some castes/categories such as scheduled castes, scheduled tribes and other backward classes. There may be a difference in the degree of educational disadvantaged in these categories or castes. But certainly the students belonging to above castes/categories suffer from inherent lack of educational facilities and resources in their homes.

REFERENCES


Environment, Unpublished Doctoral Dissertation, University of New Mexico.


Carker, D.D.G. (1999) The Relationship of Study Habits, Attitude and Motivation to Academic Achievement in Selected Course of Study at Historically
Black University, *Dissertation Abstracts International*, 2000, Vol.60(9), 3246-A.


Kumari, Balesh (1988) A Study of Learning Style Preferences of Adolescent Students in Relation to Their Personality Type, Anxiety, Sex and Area of Study. *M.Ed. Diss. HPU*. 

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Kumari, Balesh (1995) A Study of Learning Styles of Socio-Economically Advantaged and Dis-Advantaged Adolescent Students in Relation to Their Intelligence, Locus of Control and Personality Types. Ph.D. Thesis, Edu., Ch.CSU.


Review of Related Research


Verma, B.P. and Kumar, R. (1996) Study Involvement and Learning styles of Women Students as Related to Residential Background, Academic


