Chapter – II

Review of Literature
REVIEW OF LITERATURE

Various theoretical aspects in relation to learning styles discussed in the last chapter indicate that learning styles have been actively studied and understood by the researchers engaged in this area. However, a detailed study, and review of the researches/studies in the past indicates that the concentration has been more from the educational viewpoint and less from the psychological viewpoint. An effort was made to collect the studies related to learning styles and memory, but these are just too few. Therefore, instead of concentrating only upon learning styles and memory, the investigator decided to review all the studies in this chapter which seem to be somewhat related to the present work.

The factors like the predictors of learning styles, effect of learning styles (also besides Kolb’s) on task performance, correlation between the performance of various modality learners, strategies being employed by different types of learners, individual differences in learning style, like sex, age and personality have been investigated during the past. But not much studies could be grouped when arranged independent or dependent variable wise. Therefore, the studies are presented in a chronological manner.
Titus, Bergandi and Shyrock (1970) investigated adolescent learning style among high school students by means of Kolb Learning Style Inventory. Comparisons were made between males and females freshmen and seniors, and students assigned to slow and fast learning tracks. The results indicate that the adolescent sample tended somewhat more toward the concrete and a good deal less toward the abstract than did an adult sample. Furthermore, females were more concretely oriented than male subjects and more homogenous as group in their learning. Slow track students were more reflective, more active and less abstract than fast track students. Possible applications to instructions were described, such as presenting educational material in a more concrete fashion to freshman and then making it more abstract as the student mature.

Richard (1972) administered the Rokeach Dogmatism Scale (RDS) and a group from the Embedded Figures Test (CF-I) on a group of 128 high school junior and senior boys. A sample of 64 boys was chosen from the 128 on the basis of extreme scores on the RDS and CF-1. This allowed the formation of four groups of 16 subjects each, representing the four high low combinations. Each subject was then randomly assigned to learn one of four serial list of CVC NSS. The social lists varied on term of meaningfulness (M) and item similarity (S), and represented the four
combinations of high M – low S, high M high S low M low S and low M high S. This procedure resulted in a $2 \times 2 \times 2 \times 2$ factorials. On various theoretical grounds it was hypothesized that dogmatism and field dependence should each be related to ease of serial verbal learning. In particular, it was anticipated that there should exist ordinal interaction between dogmatism and item meaningfulness and between field independent and item similarity. A low correlation between dogmatism and field dependence was also expected. The results indicated a significant main effect for similarity, and interactions between similarity and meaningfulness, field independence and meaningfulness and similarity meaningfulness and field independent. The results were dominated by the interaction between similarity, meaningfulness and field independence. It appears that in the learning of item of high meaningfulness the learners pass if the potential similarity among the items and operate using the relationships initiated by their meaningfulness.

Cecil (1975) designed a study to investigate the extent to which designated learning styles are reflected in academic performance on paper and pencil tests. He concluded that a large percentage of persons who choose the same professional career and meet the criteria to be accepted
into that career in a particular educational programme are, people who have a relatively flexible learning style. These findings indicate that the flexible learning style may be a need of the people in the educational field.

Kaley (1977) tried to explore the relationship of field dependent/field independent and learning style. The study also investigated the ability to predict learning style from anyone or any combination of independent variables of reading achievement, I.Q and Group Embedded Figure Test (GEFT) score. The findings suggested that reading achievement significantly predicted learning style when considered alone or in combination with I.Q. However I.Q significantly predicted the learning style only when considered together with reading. The factor of field dependent/field independent measured by GEFT was not a significant predictor of learning style.

In a study conducted by Rollins and Genser (1977) a task was devised that favored the impulsive approach to problem solving. Impulsive, reflective, fast/accurate and slow/inaccurate, male, third- and fourth-grade children learned to choose one of a pair of multidimensional stimuli based upon a single cue. In one condition, the stimuli were composed of many dimensions; in other, few dimensions. Reflective
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subjects solved the task with few dimensions more quickly than impulsive, whereas subjects solved the task with many dimensions in fewer trials. Fast/accurate and slow/inaccurate subjects solved problems in an intermediate number of trials but also reversed positions as a function of the number dimensions. Both speed and accuracy components of cognitive style contributed to performance in the cognitive task.

Kennedy and Butter (1978) administered the Visual Matching Familiar Figure Sequential Presentation Task (MFF-SPT) and the Auditory Impulsivity Task (AIT), (two match-to-sample tasks designed to measure cognitive style), upon 81 4th graders. A moderate negative correlation was found between errors and latencies on the AIT, thus indicating that longer latency did not always result in better performance. A high negative correlation was found on the MFF-SPT. Fifty five percent of the subjects maintained their classification as reflective, impulsive, fast-accurate, or slow inaccurate across the two modalities, providing evidence that the two tasks were measuring somewhat different abilities. Subject employed the same search strategy in both modalities. It is suggested that auditory cognitive style be investigated for relationships with reading ability.
In a study by Ribich and Schemeck (1979) three self-report instruments assessing “Learning Style” were administered to 106 undergraduates—the Inventory of Learning Processes, Study Behaviour Questionnaire and Learning Style Inventory. Performance measures on word list and prose learning task were also obtained using both immediate and delayed retention tests. Canonical correlation analysis of the pairs of learning style instruments indicated that there was a small to moderate amount of overlapped variance. Inspection of the canonical variates revealed that what overlap existed was generally due to a common factor related to the “depth of processing” conception of memory. The inventory of learning processes and the Learning Style Inventory each obtained one significant canonical correlation with the set of prose retention measure, indicating the role of the learning style in studying individual differences in learning and memory processes, and the assessment of “depth of processing” at the level of individual differences.

However, Thomas (1979) contra indicated the impact of modality on learning style. He conducted a research to determine if treatment based on modality strengths facilitated acquisition of reading and spelling skills. He used sensory psychomotor tests to determine auditory and visual
learning style. Analysis revealed that there was no significant difference in the experimental and control group respectively. This indicates that mode of presentation does not affect the learning style.

Walker, O’Leary, Micheal, Chaney and Fauria (1979) investigated the interaction between cognitive styles imagery and memory. The Tactual Performance Test Location Score from the Halstead-Reitan Test Battery was used as a measure of incidental tactual memory and mental imagery. The Group Embedded Figures Test was used to assess cognitive style. Results for 38 Caucasian males (mean age 49.9) suggest that cognitive style is related to the subjects ability to perform a nonverbal, non visual memory task. Cognitive style may be an important mediating variable influencing intrapersonal behaviour such as nonverbal memory and mental imagery.

Cunningham, and Trickey (1983) tested 13 members (aged 21-27 yrs) of a senior occupational therapy class on the learning style inventory. Results show no significant correlation between any of the four learning styles concrete experience, reflective observation, abstract conceptualization, and active experimentation and the academic or clinical course work.
Park (1984) tested the effectiveness of the example comparison strategy (ECS) and the classical attribute identification strategy (AIS) in 12th grade students acquisition of a set of abstract verbal concepts using 34 subjects whose learning style was field-independent (FI) and 34 subjects whose learning style was field dependent (FD). Subject’s cognitive learning styles were determined by the Group Embedded Figures Test. Findings show that the AIS presentation resulted in significantly better performance in subjects of both cognitive learning styles than did ECS. AIS required a significantly longer time for subjects to complete the instructional booklet. ECS significantly facilitated prototype formation in memory and resulted in a higher degree of retention. Evidence suggests that FD subjects need more examples in expository form than do FI subjects to form the conceptual prototype.

Globerson, Weinstein and Sharabany (1985) tested whether cognitive development and cognitive style (field dependent\field independent) are different dimensions. The study was conducted within the context of Pascual-Leone’s model of cognitive development, in which an important aspect of cognitive development is delineated by mental capacity, and an important dimension of cognitive style is field-dependence/field independence. The data showed that these are distinctly
different dimensions in spite of their commonly found correlation because (a) under training conditions that were suited to the subject’s cognitive style, field-dependent 8-years-old children were able to perform developmentally appropriate “control-of-variables” tasks at the same level as their field-independent age peers, and (b) both groups outperformed 6-years-old field-independent children.

Wang (1985) reviewed psychological tests that determine individual differences in level of consciousness, memory, thought processes, comprehension, and information processing. One category of tests is aimed at determining the relationship between consciousness and environmental dependency, while another attempts to determine the level of reflectiveness/impulsiveness. A strong relationship has been found between learning type and behavioral development.

Devonport (1986) investigated learning style and its relationships to sex, age and educational attainment among Wyoming, elder hostel participants. The Gregorc’s Style Delineator was used as a measure of cognitive style. Results indicated that sex was related to learning style in two out of 4 component channels. Males scored significantly higher on the Abstract sequential channel and females and women scored significantly higher on the abstract channel than males. However, both
sexes scored higher on concrete sequential channel. Age and learning style were not found to be related. On the whole instructors should be knowledged in learning style theory, should know their own learning style and should be able to teach in a variety of styles.

Della, Dunn, Dunn and Geisert (1986) investigated the effect of matching and mismatching students mobility preferences on recognition and memory tasks. Black, White, and Hispanic 7th graders were tested for learning style (mobile or passive) and later performed a verbal learning task in either an active or passive environment. Results indicated that (1) mobility-preferenced subjects performed significantly better in the active environment than in the passive environment, (2) passive-preferenced subjects performed significantly better in the passive environment than in the active one, (3) active- and passive preferenced subjects did not differ significantly in the passive environment, and (4) passive-preferenced subjects had significantly lower achievement than the active-preferenced subjects in the active environment.

Rychlak and Marceil (1986) observed a brief demonstration in which a memory drum and consonant/vowel/consonant trigrams were used in a paired-associates format on 11th and 12th grade students. Subjects independently categorized a number of such trigrams for
likability. Sixty subjects then participated in a paired-associates task using trigrams that they had categorized as liked or disliked. Subjects who framed the task positively learned their liked trigrams more readily than their disliked trigrams. Subject’s who framed the task negatively reflected no such affective differential in learning style. A muffled chime used to emphasize success or failure in the learning task had only limited impact on the findings.

Lindsey (1987) administered the Kolb Learning Style Inventory (KLSI) to 320 North Carolina Community College, technical college and technical institute students to determine whether significant difference existed between the learning style of high school graduates and dropouts. Four types were identified: concrete experience, reflective observation, abstract conceptualization and active experimentation. But no significant differences were revealed along the students who scored highly on concrete experience, reflective observation, abstract conceptualization and active experimentation. However, all subject samples preferred to perceive information concretely and process it reflectively. This study clearly reflects that no specific learning style determines whether or not the students will continue their education up to higher level.
Martinetti (1990) investigated that whether general recall is affected by the cognitive framework used in processing. Sixty women students, ranging an age range from 18 to 22 yrs. were given the Cognitive Processes Survey which measures degree of imaginal life, attitude about imaginal life and the degree of suppression. Group of subjects were then categorized on the basis of their scores as high or low imagers and having positive or negative attitudes about imaginal life. Short-term memory was measured by the Digit Span Subtest of the Wechsler Adult Intelligence Scale. Results suggest that the element of cognitive style which has the most influence on short-term memory is the degree of imaginal activities experienced. The person’s attitude about subjects these experiences does not seem to affect the processing of short-term memory. Perhaps individuals with richer imaginal lives develop codification processes which, through repetition, allow a more effective transfer from sensory to short term memory. It is also possible that high imagers have a longer attention span than low imagers and consequently hold stimuli for a longer period of time in the short-term memory buffer system. Applied to Kolb’s Learning styles divergers may have longer span of attention, and better short-term memory.
Schumann (1990) studied interaction among working memory, cognitive performance and cognitive style (i.e. impulsivity v/s reflectiveness) in young children. It was concluded that inter individual differences in cognitive performance and cognitive style are determined by information-processing capacity. Children were taken up. In study I, the subjects were 43 male and female West German preschool kindergarten children aged 5-7 yrs; 55 kindergartens were taken up. In both studies the subjects’ working memories were assessed before they worked on a series of tasks based on the Matching Familiar Figures Test. Interaction between memory scores and performances on the various tasks were analyzed. In study II, solution times and eye movements were analyzed in addition to performance accuracy.

Kleinfeld, and Nelson (1991) examined the claim that instruction adapted to the visual learning styles of Native American students results in greater learning. It is argued that substantial cross-cultural research suggests that Native American children have special strengths in such areas as spatial abilities and visual memory and that observational learning is an important cultural orientation, but that virtually no research has succeeded in demonstrating that instruction adapted to Native Americans visual learning style results in greater learning. The concept
of Native American learning styles continues to be popular due to educators desire to avoid deficit language, the concept's use in obtaining culturally oriented program funding, and the concept's use in summarizing instructional adaptations necessary in a cross-cultural context.

Sharma (1991) examined the effects of age, educational status and cognitive style on the 4 types of need motivation (i.e. the need for affiliation, power, achievement and approval) in 90 managers and 90 workers at a steel plant. When educational status and cognitive style interact with each other, they show a highly significant result on need for achievement of managers. The significant main effect of age on need for approval can be attributed to the consequences of advancement in age. Superior educational background helps managers develop a different pattern of cognitive style that helps them display significantly greater power motivation than the workers. Thus, the results indicate a significant role of cognitive styles in the development of psychological processes of managers and workers that emerge from their structures and functions in the organization and determine their power, position, roles and status.

Verma (1991) studied the relationship between learning style and achievement motivation.51 class XI students (28 high in motivation, 23
low in motivation) completed the Achievement Motive Inventory and the Learning Style Inventory (Agarwal, 1982) subjects learning style preference was independent of achievement motivation. In other words, high and low achievement motivated subjects did not differ significantly in terms of flexibility, individualism, visual vs. arousal learning style, field independent, attention span, motivation centeredness or orientation to environment.

Richardson and Fergus (1993) examined the learning style of grade 9 students (47 boys and 67 girls) in 2 different ability groups, A and B, in the high schools of Montserrat. Results indicate a better performance of Ss in ability group, A in deep processing, fact retention, and methodical study when compared with their counterparts in ability group B. The sex difference that emerged pointed to female superiority over males on behaviours reflective of methodical study.

Adeyanju (1995) found a significant relationship between cognitive style and achievement for 271 pupils (aged 11-12 yrs). The relationship between cognitive style and achievement was no longer significant when the effect of intelligence was partialed.

Doucette; Kelleher; Murphy and Young (1998) administered the Cognitive Style Index (CEI) to 284 students enrolled in law school in
eastern Canada. The Cognitive Style Index measures the intuitive-analytical dimensions of cognitive style; lower scores are more indicative of an analytical style. Law students in general tend to be more analytical than intuitive in their cognitive style. Women scored significantly higher than did men. Third year students scored significantly lower than did 1st and 2nd years students. Subjects who preferred litigation as a field of practice scored significantly higher than did subjects who preferred the cooperate\commercial field of practice.

Truluck and Courtenany (1999) in their study attempted to determine the learning preferences of older adults and association of gender age and educational level of these preferences. In this study, Kolb (1985) Learning Style Inventory was used to identify the preferred learning style of 172 older adults from Northeast Georgia. Results in this study found the older adults fairly evenly distributed across the styles of Accommodators, Assimilators, and divergers, with fewer preferring the convergers style, which involves thinking and doing while learning. Although no significant effects were found between learning style preference and gender, age or educational level, there were some age trends noted. Most 55-65 years old age group members preferred the Accommodators learning style (Learning by feeling and doing) most 66-
74 years old age group members preferred the Divergers (learning by feeling and watching). Whereas the 75 yrs old and older group preferred the Assimilators style (learning by thinking and watching). Therefore it is suggested that not all older learners are active, hands on learners as adult education literature suggests but rather with age there is a tendency to become more reflective and observational in the learning environment.

Park (2001) studied the basic perceptual learning style preferences (auditory, visual, kinesthetic & tactile) and preferences for group and individual learning of 1,896 Armenian, African, Hispanic, Hong, Korean, Mexican & Anglo students (932 boys & 933 girls; 31 subjects had missing information about sex) in American Secondary schools. The results of the study reveal significant ethnic group and sex differences in their learning style preferences, as well as student achievement level differences. This indicates that environment may play a significant role in developing the style of learning. Results are similar to Kleinfeld, and Nelson (1991).

Beishuizen, Stoutjesdijk, Spuijbrock, Bouwmeester, and Van-der-Geest (2002) explores whether abstract concepts and rules can only be explained using examples in the context of understanding exploratory texts (ETs). By blocking the linking of concepts to examples the study
aimed to show that the understanding of abstract concepts and the acquisition of semantic knowledge is impossible without a concrete context of interpretation. 89 secondary school students (mean age 17 years) and 63 undergraduates students studied exploratory texts with no vs. many examples. In experiments 1, 2 existing texts were manipulated by either adding examples or by replacing specific concepts by more ambiguous concepts. In experiment 2, 2 exploratory texts (1 with rules, 1 with examples) on the law of large number were developed. Subjects also completed a questionnaire assessing habitual concrete elaboration (CE) whilst studying. Experiment 1 revealed that an exploratory text with ambiguous terms is difficult to understand supporting the claim that a concrete context of interpretation is indispensable. However, there was no difference in text comprehension with many vs. few examples. An explanation might be that subjects were able to think of relevant examples themselves. Evidence for this active way of text comprehension was found in experiment 2 in which an interaction between content (abstract, concrete) and learning style (high or low on CE) appeared.

Dahrai (2002) studied the relationship between learning style and working memory and their effects on pupils learning performance. The other aim of the present research were also to investigate the relationship
between pupil’s cognitive style, working memory and conduct emotional and learning behaviours, anxiety, stability level and listening comprehension according to different speech rates. The research was carried out by means of two studies. Result in one study indicated that (a) there was no significant relationship between cognitive styles and working memory suggesting that they are independent of each other b) the effect of working memory capacity on pupil’s academic performance was significant. (c) Cognitive style in interaction with working memory capacity affected pupil’s academic performance (d) the influence of working memory capacity on pupil’s emotional and learning behaviour was significant (e) anxiety level significantly affected the efficiency of working memory.

Goode, Goddard and Pascual (2002) examined whether cognitive style differences between field independent and field dependent college student subjects are revealed as differences in event-related potential activity in a novel working memory and attentional inhibition processes task. A serial-order recall task served to manipulate memory load by varying the amount and kind of information to be elaborated and retained in working memory in order of temporal appearance (S1, S2); recall demand of the serial order judgment (S3) was also concurrently varied.
Field independent subjects engaged in deeper working memory processing during the high memory load conditions relative to field dependent subjects and this was measured as a higher amplitude slow negative wave, over the centre-parietal scalp extending to the frontal scalp, during the retention interval. In contrast, P300 amplitude was larger for field dependent subjects in the high memory load conditions following S1, which corresponded with a reduced amplitude slow negative wave. It is suggested that inhibitory processes indexed by P300, which field dependent subjects must mobilize to change their usually global perceptual attentional strategy for processing task information, may have resulted in less mental-attentional resources available to them during the task’s retention phase.

Kossowska, (2002) tested the relationship between cognitive strategies, intelligence and personality in a sample of 138 university students who completed an experimental task they were told was related to advertising. Strategies for handling the task material were characterized as global-analytical, detailed-general, visual-verbal and concrete-abstract. Personality traits included intelligence, neuroticism, extraversion, openness, agreeableness, conscientiousness and anxiety. The results indicated that there are distant relationships between
personality and cognitive strategies, but do not support assumptions that personality determines cognitive strategies. It is suggested that intelligence may be regarded as a process of solving intellectual tasks rather than as a superior trait that organizes and supervises intellectual functioning.

Diseth and Martinsen (2003) analyzed the relationship between approaches to learning (deep, strategic and surface), cognitive style, motives and academic achievement. A sample of 192 undergraduates' psychology students (aged 19 to 46 years) participated. Instruments used included the Approaches to Study Skills Inventory for Students (1997), the short version of the Need for cognition scale, the Assimilator Explorer Inventory (1992) and the Achievement Motivation Scale. Examination grades measured academic achievement, motives and styles were related to the three approaches to learning in theoretically meaningful ways. Moreover, approaches of learning were found to predict academic achievement, while styles and motives only had indirect effects on achievement. Among the approaches to learning, the deep approach unexpectedly did not predict achievement, while the surface and strategic approaches as expected significantly predicted achievement.
Emmett, Clifford and Gwyer (2003) explored possible causes for the variation. They examined the relationship between cognitive style and the efficiency of context reinstatement in improving free and cued recall in an eyewitness paradigm except using a live staged event and a 1 week delay indicated a significant improvement in free recall with the reinstatement of context and as expected, no such improvement in cued recall. However, analysis of the data according to field dependency, as measured by Witkin, Oltman, Raskin and Karp’s Group Embedded Figures Test (GEFT) revealed that, in free recall, field dependent witnesses scores improved significantly with context reinstatement whilst the scores of field independent witnesses did not. In cued recall, however, the field independent witnesses scored significantly higher overall than field dependent witnesses. Experiment 2 sought replication of these findings again utilized the GEFT and the Riding Cognitive Styles Analysis (CSA). Analysis of the data according to the whilst- Analytic (W-A) dimensions of the CSA, Indicated no interaction with either context reinstatement or memorial performance.

Wang, Wang and Ming (2003) tested the senior middle school (Grade II) students on the Chinese group embedded figures Test & Dynamic problems test. A 2 (Cognitive Style) × 2 (sex) analysis of
variance indicated a non-significant effect with respect to cognitive style in solving easier Dynamics problems but a main significant effect in solving complex Dynamics problems. Multiple comparisons (post hoc tests) indicated that cognitive style is a significant factor among boys but not girls. The difference between field-independent students and field-dependent students in solving complex Dynamics problems may be that the former students more easily form a clear map of notion than the latter students.

Rawal and Willson (2005) suggested that task performance is often dependent upon the congruence of cognitive style and task. To explore this suggestion, 44 female and 4 male undergraduates were administered the Cognitive Style Analysis, the Closure flexibility, the Composite Gestalt Completion Test and Vocabulary subtest from the WAIS. Specifically, four hypotheses were tested (1) that participants with an analytic style will perform better than those with a wholistic style on the closure flexibility (2) that participants with a wholistic style will perform better than those with an analytic style on the Composite Gestalt Completion Test. (3) the participants with an intermediate style will outperform persons with an analytic style on the Composite Gestalt Completion test and (4) that intermediate scores would perform better
than those with a wholistic style on closure flexibility. Only the second hypothesis was supported, so results provide only minimal support for the effect of match or mismatch of cognitive style and task performance.

This chronological review has made it explicit that although learning styles has been a popular area of research, yet the work is in highly scattered form and there is a wide gap between the studies to draw any general inferences. No much studies are available to understand the role of learning styles on memory. A guided research and more studies are required for the same.