CHAPTER II

REVIEW OF STUDIES

Interaction between Intelligence and Treatment Modes
Interaction between Creativity and Treatment Modes
Interaction between Cognitive Styles and Treatment Modes
Interaction between Anxiety and Treatment Modes
Interaction between Extroversion and Treatment Modes
Interaction between Achievement Motivation/Need Achievement and Treatment Modes
Interaction between Neuroticism and Treatment Modes
Interaction between Other Variables and Treatment Modes

References
It is well recognised that achievement is a function of both learner characteristics and treatment modes. A learner may achieve low with one instructional treatment, but may achieve quite high when another instructional method is employed. In recent years quite a few studies have been conducted to investigate the interaction between the different personality and mental ability variables and instructional treatment modes. These studies have been called as Aptitude-Treatment Interaction or Attribute-Treatment Interaction (Tobias, 1976), ATI or Trait-Treatment Interaction, TTI (Berliner and Cohen, 1973). These studies have attempted to investigate the interaction between quite a large number of personality and mental ability variables and a variety of instructional treatment modes. Bracht (1970), Tobias (1973) and Berliner and Cohen (1973) have presented exhaustive reviews of these studies. According to Bracht (1970) more than 95 studies had been attempted up to 1969 alone. Sufficient research work has been attempted in this area since the year 1969 and according to the estimates of the present investigator, around one hundred and twenty studies have been completed till the year of writing this review. Therefore, it would not be possible to review all the studies conducted in the area. However, an attempt has been made to review the representative studies. This review has been presented in the
following pages.

**INTERACTION BETWEEN INTELLIGENCE AND TREATMENT MODES:**

It is a well known fact that intelligence is the single most important factor contributing to scholastic achievement. Therefore, Cronbach and Snow (1969) recommend the development of alternative treatments on the basis of general mental ability or intelligence. In view of the importance attached to intelligence, some educational psychologists have attempted to individualise instruction on the basis of intelligence or mental ability alone. In the following pages review of studies concerned with the interaction between intelligence and various treatment modes has been presented. Some investigators have sought to investigate the relationship between intelligence and single treatment methods while others have attempted to investigate the interaction between intelligence and two or more than two treatment methods.

(A) Intelligence and Single Treatment:

Silberman (1961) conducted an empirical study to investigate the interaction between intelligence and one treatment method. The method consisted of a programme with multiple choice answers. He concluded that intelligence and achievement through the above programme were significantly related. The sample of study was high school students. Limbert and others (1962) observed that intelligence was
significantly related to immediate achievement through linear programmed instruction. But Glaser and Reynolds (1962) while investigating the learning variables in programmed instruction concluded that intelligence does not predict learning from a linear programme.

Steluwrow (1964) with a small group of 20 highly intelligent, + 13 years old students found that the scores on intelligence or mental age did not significantly correlate with any of the scores based upon self-instructional material in logic, mathematics, or statistics. But Evans (1965) obtained a positive and significant correlation between intelligence and achievement through a programmed material on the same material.

Davis and Leith (1967) conducted a study to establish where, when and how a programme functions at optimal efficiency and obtained a value of Pearson's coefficient of correlation of +0.495 (p < .001) between intelligence and achievement through 'Clearway Programmed Book Logarithms', devised by J. Hartlay (1964). The significant correlation shows that high intelligence group achieved better than low intelligence group.

O'Heily's (1960) tried to explore the relationship of some psychological variables including verbal intelligence and achievement through a linear programme. The sample consisted of 120 boys and 122 girls of sixth grade.
The regression analysis of the data indicated that verbal intelligence contributed to achievement significantly. The result also revealed that only verbal intelligence contributed significantly to error rate on programme.

Bhushan (1973) attempted to study the relationship between different personality and mental ability variables including intelligence and achievement through a linear programme. His sample consisted of 42 (27 males and 15 females) B.A. and students teachers. The analysis revealed that the post test scores were significantly and positively correlated with intelligence.

Sansanwal (1978) conducted a study to find out the relationship between achievement through programmed learning and intelligence. Measures of academic motivation and English language comprehension were employed as controls. The 24 M.A. and 43 M.Sc. students formed the sample of the study. The achievement of students through programmed learning was found to be significantly related with intelligence.

A review of the studies involving interaction between intelligence and single treatment mode reveals that quite a few of them have succeeded in establishing significant interaction between them. They show that students of high intelligence achieve high through the treatment mode investigated and vice versa. Bhushan, 1973; Sansanwal,
1978; O'Reilly, 1969; Davis and Leith, 1967; Evans, 1965; Limbert and others, 1962; Silberman, 1961). Some have, however, failed to reveal any interaction between intelligence and treatment modes employed by them (Stelurow, 1964; Glaser and Reynolds, 1962). The lack of interaction obtained in the above studies may be due to the treatment modes employed by them and the range of intelligence of the subjects of the study. Better interaction may be obtained by employing more than one treatment modes. Bracht (1970) also support this view. He writes that "Research with alternative treatment which rely differentially on general ability may provide evidence for the occurrence of ATI".

Studies have also been conducted to investigate relationship between intelligence and more than one treatment modes. A review of such studies has been presented in the following paragraphs.

(B) Intelligence and Two or More Treatment Modes:

McConnell (1934) in a study to compare the relative effectiveness of discovery and authoritarian method of teaching obtained a higher correlation between mental age and achievement through authoritarian method as compared to achievement through the discovery method. The sample of his study was six hundred and fifty three pupils of second grade arithmetic from fifteen different schools.
Guetskow and others (1954) in an experimental comparison of recitation (A-V) discussion and tutorial methods found that different levels of intelligence did not call for different methods of teaching. Heigh and Schmidt (1956) also obtained insignificant interaction between intelligence and teaching through teacher centered and group centered methods of teaching.

Yard (1956) in an experiment to assess the comparative effectiveness of group study and lecture-demonstration methods in physical science instruction found that high mental ability group achieved more from group method whereas students with low ability benefitted more from lecture-demonstration, method of teaching.

Calvin, Hoffman and Harden (1957) attempted to investigate the interaction between intelligence and achievement on problem solving behaviour through authoritarian and permissive classroom climates. It was found that low intelligence group achieved significantly higher through authoritarian climate whereas high intelligence group achieved higher through permissive climate.

Porter (1959) carried out an experiment in the teaching of spelling to elementary school children. In the experiment one group was taught via machine teaching (experimental group) and the other through conventional
method (control group). The analysis of data revealed that the coefficient of correlation between intelligence and achievement through machine teaching was -0.128, which is now significant whereas that between intelligence and achievement through conventional method was +0.343, which is significant at 0.05 level. But Hatch and Flint (1962) concluded that intelligence is significantly related to achievement through both programmed and conventional teaching methods. Hay (1961) in a study to compare the relative effectiveness of discovery and direct instruction method of teaching for students with different levels of intelligence did not obtain any significant interaction between the above mentioned teaching methods and intelligence. The experiment was performed with 117 students of class ninth on a task of '0-1 inch micrometer caliper'.

Reed and Hayman (1962) in an experiment involving use of "Baker 2600" an automated instruction text found that high ability group achieved significantly higher from programmed learning method whereas the low ability group achieved higher from classroom instruction.

Hutchinson (1963) designed an experiment to study the relationship between mental age and two methods of teaching (authoritarian and creative teaching) of Highschool students. The control group was taught through authoritarian teaching and another experimental group was taught through creative teaching method. The result indicated that among
the control subjects there was a significant correlation between mental age and achievement gain. In contrast there was no correlation between mental age and achievement gain for the experimental group.

Wittrock (1963) conducted a study with 80 elementary school children. The experimental group was taught 'A kinetic molecular theory programme' by responding aloud whereas the same programme without overtly responding was administered to control group. The analysis of variance revealed a significant ($p < .05$) interaction between mental age and response mode. The analysis further revealed that overt response mode was more effective with the below medium mental age students than above medium mental age students.

Shah (1964) developed a programme on equation solving for class sixth in an English medium school in Delhi and evaluated it against conventional lecture method for achievement of students of different ability (intelligence) levels. The analysis of covariance showed that although programmed learning was more effective as compared to conventional teaching method, but there was no significant interaction between treatment and ability (intelligence) measures. Foord (1964) in a study comparing the effectiveness of programmed instruction (deductive approach) and programmed instruction (inductive approach) for achievement by students of different I.Q.'s concluded that no significant interaction existed between the method and level of intelligence.
Hartlay (1965) in a study of 68 secondary school girls found that the linear programme does not correlate with intelligence as measured by Heim's AH-4 intelligence test, whereas branching programme correlate significantly with intelligence. The result further revealed that low ability students were equally profited by linear and branching programmes but the students with higher ability shows a better mark of achievement from branching programme in comparison to linear one.

Desai (1966) attempted to study the comparative merit of programmed and conventional methods of teaching for students with different levels of intelligence. The sample of the study consisted of 80 students studying in class ninth. The result revealed that although programmed learning method was more effective than the conventional one, but intelligence, as measured by Desai's Intelligence Test did not interact significantly with either programmed or conventional method of teaching.

Rei (1907) conducted an exhaustive study to compare two methods of teaching viz. lecture-cum-demonstration and question-answer-cum-demonstration. His sample consisted of 40 boys of class eighth. After the teaching for twenty-one periods of 40 minutes each, he concluded that high intelligence students profit more with lecture-cum-demonstration method of teaching as compared to question-answer-cum-
demonstration method of teaching. The low intelligence students show no significant difference in achievement gain by the above two methods.

In an experiment conducted to study the relationship of different intelligence levels and different methods of teaching, Katz (1967) failed to obtain any evidence to support the proposition that students with different levels of intelligence should receive different instruction for optimal achievement. Similarly Gagne and Wiegand (1968) failed to obtain a significant interaction between mental ability and instructional modes. The study deals with learning to concrete rules by fourth graders.

A study carried out by Jamieson and others (1969) with 96 female and 88 male students of postgraduate level for comparing the relative efficiency of the programmed learning A-V Lecture and lectures method of teaching for academic achievement concluded that programmed learning was the most superior method but failed to obtain any evidence regarding interaction between intelligence and the methods employed.

Ripple, Kilmann and Glick (1969) attempted to study the relationship between selected characteristics of the students including intelligence and relative degree of success through programmed versus conventionally structured method for teaching vocabulary (word meaning and usage). The sample consisted of 1100 students of grade eighth from 22
schools. Four way analysis of variance revealed no significant interaction of intelligence with any of the treatment modes.

Keisler and Stern (1970) conducted a study with 82 children from second and third graders to investigate the relationship between mental age and achievement by two different teaching strategies — single hypothesis strategy and multiple hypothesis strategy. The single hypothesis strategy is analogous to Bruner's conservative focusing whereas the multiple hypothesis strategy is analogous to Bruner's scanning. Heir results revealed that children of high mental age profit more from multiple strategy whereas children of lower mental age profit more from single strategy. In another study Stern and Keisler (1967) confirm the above findings.

Koran (1971) conducted a study at the University of Texas with 167 upper division students enrolled in an introductory course in teacher education to study the interaction of abilities (induction, reasoning, verbal comprehension and memory) and two treatment methods (vis. inductive and deductive programming). A 2x2 analysis of variance revealed that on the criteria of time, both inductive and deductive treatment methods were almost equally effective. The analysis further concluded that induction, verbal comprehension and reasoning score interacted significantly with above two treatment methods.
Nagar (1971) tried to compare the achievement through two instructional methods—Harbartian method and linear programme at three different levels of intelligence employing stratified sample of 207 boys and 143 girls of class ninth. He concluded that intelligence and methods of teaching did not interact significantly.

Kapadia (1971) computed coefficient of correlation between intelligence, as measured by Desai and Bhatt Group Test, and achievement through linear and branching programmes after partialling out the effect of anxiety, self-sufficiency and introversion/extraversion. He obtained an significant and positive relationship between intelligence and achievement through the above two methods.

Pandya (1974) carried out a study to determine the relationship between intelligence and achievement through programmed learning and conventional method by a group of 7th class students. The topic was 'Light'. Achievement motivation was used as a control variable. The study revealed that the students of different mental ability levels profit more from programmed method as compared to conventional method.

Ayman (1974) in a study to compare the relative effectiveness of 'modern approach' (Suffield approach) and 'traditional approach' on children's understanding of taxonomy at two levels of intelligence found that an interaction between intelligence and teaching methods existed.
The 'modern approach' favoured above than average intelligence students whereas the 'traditional approach' was favoured by below average intelligence students. Ayman (1977) in another study with 96 first year of secondary education students confirm the above interaction effect. He also concluded that the use of 'modern approach' was particularly unsuitable for girls of below average ability.

Phushan and Sharma (1975) conducted a study comparing three instructional strategies — traditional, programmed instruction and programmed instruction followed by lecture — at three different levels of intelligence. The result showed that achievement through programmed instruction (linear) followed by lecture was the highest of all the three treatments at all the intelligence levels. Out of remaining two treatments, programmed instruction was found to be superior to the lecture method for all the three intelligence groups. Thus levels of intelligence showed no interaction with any of the methods included in the study. The subject of the study were B.Ed. students and subject matter was rank correlation.

Patel (1975) attempted to study the effectiveness of programmed learning and conventional teaching in geometry for standard IXth for different variables including intelligence. Programmed learning proved to be more effective than conventional for different levels of intelligence.
Govinda (1976) developed a programmed text on testing and technique of evaluation for B.Ed. students and attempted to study the relationship between achievement through programmed and structured lecture method and attitude, intelligence, academic motivation and English language comprehension. The matched group design with 35 students in experimental and 34 students in control group was adopted for conducting the experiment. The study did not reveal any interaction between intelligence and the two treatment mode employed.

Sadhi (1977) attempted to study the relationship between different variables including intelligence and achievement through linear programme and lecture method on a group of 15 students of class IXth. The study revealed no interaction between intelligence and achievement through the above modes.

Singh (1977) attempted to study the relative effectiveness of three instructional methods - linear and branching programming and conventional methods for teaching arithmetic to VIIIth class students with different levels of intelligence. Significance of difference between means of scores obtained by the students of different groups was ascertained by computing 't' values. It was found that branching programme was specially suited for high and medium intelligence groups and the low intelligence group
benefited more by the linear programme. The branching program was superior than the linear for both high and medium intelligence groups. Branching program was also superior than conventional for high intelligence group but not for medium intelligence group. Linear programme was inferior for both high and medium intelligence groups but better than conventional method for low intelligence group.

Bhusan and Tyagi (1977) conducted an empirical study to investigate the interaction between intelligence and treatment methods. The two treatment methods consisted of a linear programme in geography with two response modes — constructed response and discriminant response mode. The sample was of sixty students of class eighth. It was found that the two response modes interacted significantly with intelligence. Although the average and above average intelligence groups showed no significant difference on the measure of achievement gain, but the achievement gain of below average intelligence group was significantly lower than the other two groups in both the treatments.

Sheehan and Hambleton (1977) in a study to adopt instruction to individual differences found that intelligence showed no significant interaction with the instructional modes employed. The instructional modes employed were teacher directed, media, reading and programmed instruction.
Agarwal (1978) conducted a study to investigate the interaction between intelligence (verbal and non-verbal) and achievement through three treatment modes—linear programme, branching programme and expository method of teaching. The sample of the study consisted of 125 students of class eighth and the subject matter under study was 'arithmetic'. The partial correlation of the intelligence (after partialling out the effect of creativity and anxiety) with the achievement through all the three treatment modes revealed that intelligence plays a very important part for achievement through branching programme and is least important for expository method. The correlations further revealed that intelligence seems to be more important for linear programme than for expository method.

Gupta (1978) attempted to investigate the relationship between intelligence and analytic—synthetic method and Narration—Explanation method of teaching. His sample consisted of 110 students of VIIIth and IXth classes. Previous achievement was used as control variables. The analysis of covariance revealed that high intelligence class VIIIth students did not differ significantly with respect to their achievement through the two modes under study, whereas the analytic-synthetic method was found to be more effective than narration-explanation method to the low intelligence students of VIII class. For class IXth,
the analytic-synthetic method proved to be significantly better than the narration-explanation method for low as well as high intelligence groups.

Hermann and Hinckelman (1978) attempted to study the relative effectiveness of inductive and deductive approach of programming for students with different levels of I.Q. The only difference in the two treatments was the relative placement of rules and examples. The study revealed that intelligence did not interact significantly with either inductive or deductive programming approach.

The review of above mentioned studies clearly indicates that some of them have obtained significant interaction between intelligence and treatment modes (McConnell, 1954; Ward, 1956; Calvin and others, 1957; Porter, 1959; Hatch and Flint, 1962; Reed and Hayman, 1962; Hutchinson, 1963; Wittrock, 1963; Hartley, 1965; Hui, 1967; Stern and Keisler, 1967; Keisler and Stern, 1970; Koran, 1971; Kapadia, 1972; Ryman, 1974 and 1977; Singh, 1977; Bhushan and Tyagi, 1977; Gupta, 1978; Agarwal, 1978). The above mentioned studies clearly indicate that intelligence or a measure of mental abilities plays a crucial role in assigning treatment mode. The different intelligence levels require different treatment modes for optimal gains. However, there are some studies which have obtained statistically
insignificant relationship between intelligence and treatment mode (Guetskov and others, 1954; Haigh and Schmidt, 1956; Ray, 1961; Shah, 1964; Poord, 1964; Desai, 1966; Katz, 1967; Gagne and Wiegand, 1968; Jamieson and others, 1969; Ripple and others, 1969; Nagar, 1971; Pandya, 1974; Patel, 1975; Bhushan and Sharma, 1975; Govinda, 1976; Sodhi, 1977; Sheehan and Hambleton, 1977 and Herman and Hinkson, 1978). The insignificant finding could have been due to poor design and small sample. Desai (1966), Stolurov (1964) and Govinda (1976) have employed samples of even less than 100 subjects. The lack of significant interaction could also be due to minor differences in treatment modes employed by them. For example, Bhushan and Sharma (1975) employed programmed learning and programmed learning followed by lecture method, which are obviously not very different and hence an interaction can not be expected.

**INTERACTION BETWEEN CREATIVITY AND TREATMENT MODES:**

The studies reviewed in the preceding paragraphs have shown that intelligence is quite an important variable for selecting treatment modes for optimal gain, but some investigators feel that additional advantage can be gained if besides intelligence some other mental ability variables are also used to select the instructional treatment modes (Stolurov, 1964). The studies in the area suggest that
creativity or divergent thinking ability may interact with treatment modes. Quite a few studies have attempted to explore the relationship between creativity and different treatment modes. A review of such studies has been presented in the following pages.

Some of the investigators have studied the interaction of creativity and single treatment modes while the others have investigated the interaction between creativity and two or more treatment modes.

(A) Creativity and Single Treatment Mode:

Stolurow (1962) conducted a study with 20 high-school students ranging in age from 13 to 15 and in I.Q. from 112 to 157. He used self-instructional material in logic, mathematics and statistics. These students were scored for originality with the help of three Guilford's Tests and low TAT cards with instructions to make up a story. The originality scores obtained from Guilford's test correlated significantly with achievement on the statistics unit while the originality score obtained from the T.A.T. test correlated significantly with mathematics final examination marks.

Gotkin and Nassa (1963) carried out a study to establish the relationship between creativity and achievement through programmed learning. 42 highly intelligent fourth and fifth grade pupils received about 30 minutes
per day of programmed instruction in language art for a period of about two months. The post achievement test revealed that among the fifth grade pupils it was the less creative who made significantly greater achievement gain. The relationship between the measure of creativity and post test achievement was -0.34 and -0.29, respectively for IVth and Vth grade. The study also revealed that most of the highly creative children expressed a strong dislike for programmed instruction, while almost all of those in the lower half of the distribution liked programmed instruction.

Doty and Doty (1964) in a study to establish the effectiveness of programmed instruction in relation to some student characteristics including creativity found a significant (+)ve correlation between creativity and achievement through programmed instruction. The sample of their study was 100 college undergraduates of age 18-19 years.

O' Reilly's (1969) study aimed at determining the importance of creativity for achievement through programmed learning. The result showed that creativity did not contribute significantly to achievement through programmed instruction. Welcomé (1973) in his study reported that high creative childrens of class seventh, eighth and ninth grade achieved well under individualized learning situation.

A review of studies involving the interaction
between creativity and single treatment mode are very few. However, most of the studies have succeeded in establishing significant interaction between them (Stolhurow, 1962; Gotkin and Massa, 1963; Doty and Doty, 1964 and Welcomme, 1973). The study of O'Reilly (1969) did not obtain any significant interaction between creativity and the treatment mode employed.

(B) Creativity and Two or more Treatment Modes:

The above studies have employed single treatment modes. Some studies have also attempted to investigate the interaction of creativity with two or more treatment modes. In the following pages the review of such studies has been presented.

Hutchinson (1963) conducted a study to investigate the interaction between creativity and achievement through authoritarian and creative method of teaching. With a sample of highschool students he obtained a significant relationship between measures of creativity and achievement in an experimental group taught through creative teaching method whereas no significant relationship was obtained for the control group taught through authoritarian method of teaching.

MacDonald and Rath (1964) using the Minnesota Tests of Creative Thinking (Torrance, 1962) divided 81 children in the intermediate grades into three groups
(high, middle and low creativity) with a view to adopt
twelve different curricular tasks to their learning styles.
In a carefully controlled experiment the above mentioned
three creative groups were given a series of twelve fifteen
minute curricular tasks. The twelve tasks were (i) three
frustrating tasks one each in the areas of ideas, numbers
and words, (ii) three closed tasks in which every student
was required to respond alike to be successful, (iii) three
open tasks and (iv) three passive tasks which required the
children to only listen to the material. The study revealed
that high creative thinking ability children were signifi-
cantly more productive on the frustrating task than the
other two groups. The children low in creative thinking
ability were significantly low on the frustrating task than
the other two groups. The low creative thinking ability
group was significantly less productive than the other two
groups on the 'open' task. There were statistically no
significant differences among the three groups on the
closed and permissive tasks. Thus it appears that children
who were low in creativity tend to dislike frustrating
curricular tasks and to frustrating tasks. Those high in
creativity tend to dislike closed assignments. The results
thus suggest that pupils of varying level of creativity
should be taught by varying procedures for optimal gains.

In an extensive study conducted to investigate
interaction between two levels of creativity (high and low), two response modes (constructed response and reading) and two kinds of material (familiar and technical), Tobias (1969) found that creative students achieved higher under all conditions, thereby, indicating absence of any significant interaction between creativity and treatment modes employed. The creativity score was calculated by Remote Association Test, which conceptualizes creativity from associationists point of view. The study, however, reveals significant interaction between subject matter and response mode. The constructed response mode group achieved more on technical material than on familiar subject. The subject of the study were 100 students recruited primarily from educational psychology class with a mean age of 20.5 years.

Ripple, Millman and Glock (1969) in a study with junior school children found no interaction between certain student characteristics including creativity and achievement through programmed instruction and conventionally structured learning task. The subject matter was meaning, and usage of 24 English language words.

Crocker and others (1976) attempted to study the interaction between verbal and figural creativity and structured and unstructured teaching strategies. Programmed instruction constituted structural strategy, and expository method an unstructured strategy. The sample of the study was 120 sixth grade students. The result showed no
statistically significant interaction of either structured or unstructured teaching strategies with creativity.

Agarwal (1978) conducted a study with 125 students of class eighth to investigate the relationship between creativity and achievement through three treatment methods - linear programme, branching programme and expository method. The partial correlations, after partialling out the effect of anxiety revealed that creativity has insignificant relation with achievement through either linear or branching. It yields a slightly better relation with achievement through expository method. The \( r = +.34 \) (\( S.E. = .15 \)) which is significant at .05 level.

A review of studies investigating the interaction between creativity and achievement through different treatment modes reveals that some of them have obtained insignificant interaction between the two (Tobias, 1969; Ripple and others, 1969; Crocker and others, 1970). This seems to have occurred due to the fact that in most of these studies relevant subject variables have not been controlled adequately and/or the independent variables had not been defined objectively (Tobias, 1969). However, there have been some studies which have obtained significant interaction (Hutchinson, 1963; McDonald and Nuthe, 1964; Doty and Doty, 1964; Melcome, 1973; Agarwal, 1978). It would be noted that
these are some of the well designed studies and conducted by fairly well known researchers. It would, therefore, be safe to conclude that an interaction does exist between creativity and treatment modes specially when one of the modes studied either seems to dampen or promote creative potential of the learner. Torrance also writes, "Children with differentially developed mental abilities profit differentially from different methods of instruction".

INTERACTION BETWEEN COGNITIVE STYLE AND TREATMENT MODES:

Recently some workers in the area have attempted to study the interaction between cognitive style and instructional treatment modes. Cognitive styles are likely to play an important role in determining success through instructional treatment. For example, field independent student may achieve higher with unstructured instructional methods of teaching and field dependent students may achieve higher with teacher dominated method. Similarly, the students with analytic and non-analytic cognitive styles may differ in their achievement employing such instructional treatments as inductive and deductive method of teaching. A review of such studies has been presented in the following pages.

Brown and Coop (1970) conducted a study to investigate the interaction between cognitive style and achievement through teacher structured approach and independent problem
solving approach of teaching. The sample consisted of 170 undergraduate educational psychology students, out of which 40 most analytic and 40 most non-analytic students were identified on the basis of Siegel Cognitive Style Test. The study revealed an insignificant interaction between cognitive style and treatment mode employed. Grieve and Davis (1971) also did not obtain any significant interaction between analytic and non-analytic cognitive style and method of instruction. The sample of their study was IXth grade students of geography.

Nelson (1972) conducted a study to find out the effects of analytic global (non-analytic) and reflectivity-impulsivity cognitive styles on the acquisition of geometry concepts presented through emphasis or no emphasis and discovery or expository lessons. The study revealed that neither type of instruction was more effective either for analytic or for global subjects.

Grippin and Ohnmacht (1977) carried out a study to find the interaction between field independence and dogmatism (cognitive style variables) and achievement on a programmed learning task with and without strong prompts. The study did not reveal any significant interaction between the cognitive style variable and treatment modes employed. The subjects were 47 undergraduate students and the subject matter was Russian vocabulary lesson.
Thornell (1977) attempted to study the relationship the analytic and non-analytic dimensions of cognitive styles and two instructional strategies varying in the degree of written guidance provided to the learner. The subject matter was mathematical symmetry. The study did not obtain any interaction between cognitive styles and treatment modes employed. Similarly Douglas and Verna (1979) conducted a study to find out the interaction between field dependence-independence cognitive style and achievement through low guidance or a high guidance treatment modes. The subjects were 61 prospective elementary school teachers and the subject matter was 'Networks' in mathematics. The study revealed no significant interaction between cognitive style and treatment modes employed.

Douglas and Kahle (1978) attempted to identify the possible interaction between cognitive styles. Field dependence and field independence of the students and deductive and inductive sequence of instruction. The subjects of their study were 627 (312 females and 315 males) biology students from six midwestern highschools. The subject matter was Mendelian genetics. The control and treatment groups were equalised on the basis of derived I.Q. The study revealed that the interaction of cognitive style and instructional sequence was not significant. However, when only those students found in the tails of the field
dependence—dependence continuum were considered, the interaction reached significance at .001 level. The nature of the treatment aptitude interaction was such that field independence subjects experienced greater success with the inductive method and the field dependence subjects experienced greater success with deductive method.

Douglas and Verna (1979) attempted to study the interaction between field independence cognitive style and achievement through discovery and expository treatment modes. The subjects were 46 prospective elementary school teachers and the subject matter was numeration system in mathematics. Multiple regression analysis revealed a significant disordinal interaction. The field independent students achieve most in a discovery treatment, and field dependent students learn best in expository instruction. Cleod and others (1978) in a similar type of study and on the similar type of mathematics content also found a significant interaction between field independence and instructional treatment modes.

A perusal of the study reviewed above shows that the studies investigating interaction between analytic and non-analytic cognitive styles and different instructional modes have not shown any interaction (Brown and Coop, 1970; Grieve and Davis, 1977; Nelson, 1972; Grippin and Vehmasch, 1977; Thornell, 1977; Douglas and Verna, 1979) while the studies employing field independence—dependence and different
Instructional modes have generally present evidence of significant interaction (Douglas and Kahle, 1978; Douglas and Verna, 1979 and Mcleod and others, 1978). However, the study by Douglas and Verna (1979) employing field dependence independence as cognitive style and programmed learning with and without prompt as treatment mode has not shown any interaction. This perhaps is due to the fact that the instructional treatments differ very insignificantly and the difference does not seem to have any relationship with the cognitive styles employed.

Interaction between anxiety and treatment modes:

Anxiety is a highly unpleasant and painful state of tension which the individual does any thing to get rid off. Anxiety is for the personality what pain is for the body. The importance of anxiety as a powerful influence in our present day civilization is acknowledged in all quarters. Since the effectiveness of different treatment modes varies with individual differences in personality, hence there is a possibility of an interaction between anxiety and treatment modes (Sarason, Mandler and Chaighall, 1952; Flander, 1951). In the following pages a review of such studies has been presented. Some studies have sought to investigate the interaction between anxiety and single treatment mode while the others have sought to investigate the interaction between anxiety and two or more treatment modes.
(A) Anxiety and Single Treatment Mode:

Kight and Sarasonrath (1966) investigated the relationship between anxiety and achievement through linear programme on test construction. The study revealed that high anxiety group worked faster and made fewer programme errors in comparison to low anxiety group. There were, however, no achievement differences between the low and high anxiety groups. The sample of the study was 139 undergraduates.

O'Reilly and Ripple (1967) attempted to study the interaction between anxiety and learning through linear programme dealing with longitude and latitude. His subjects were sixth grade students. The study revealed that there was a correlation of -0.53 between achievement and test anxiety, measured by Sarason's Test Anxiety Scale for children, thereby showing that low anxiety subjects achieve higher than the high anxiety subjects with linear programmed instruction method. But Davis and Leith (1967) in a similar type of study on a 'Clear way Programmed Book Logarithms' devised by J.Hartley (1964) obtained insignificant relationship (r = +0.106) between achievement through programmed task and anxiety. Similarly a study by Gangopadhyaya (1971) revealed no significant differences in achievement of lower and higher anxiety group on a constructed response programme.
Most of the studies reviewed above (Kight and Sarrenrath, 1966; Davis and Leith, 1967; Gangopadhyaya, 1971) show that anxiety does not play any significant part in learning through programmed method. However, one of the studies (O'Reilly and Ripple, 1967) did obtain a significant negative relationship showing thereby that subjects with a low level of anxiety are likely to achieve better. Thus there is a need for further researcher, for dependable conclusions.

(B) Anxiety and Two or More Treatment Modes:

Some research workers have attempted to investigate the interaction between anxiety and two or more treatment modes.

Grime and Allinsmith (1961) after a study of the relationship between anxiety and structured (programmed) and unstructured method (traditional) of teaching concluded that anxious students performed better through structured method (programmed learning) than unstructured method (traditional). Traweek (1964) in a study with fourth grade learners also concluded that learners with high level of anxiety achieved more in a programmed instructional treatment than would have been expected if they had been taught by traditional method. Similarly Leith (1959) in a study to assess the effectiveness of programmed learning - complete guidance and guided discovery treatment reported
that high anxiety group scored significantly higher than the low anxiety group learning under complete guidance treatment while the reverse was true for guided discovery treatment.

Flynn and Organ (1966) tried to explore the effectiveness of programmed instruction in relationship to anxiety and other variables on an introductory unit of vector geometry. Two sets of students, equated on the basis of intelligence and achievement prior to instruction were instructed through programmed instructional method and teacher instructional method separately on a uniform subject matter. A 2 x 3 analysis of variance revealed that the interaction between anxiety and instructional modes was not significant. Similarly, Leche (1967) in a study of interaction between anxiety and two response modes found no statistically significant interaction between the two on a vocabulary programme for eighth grade students. The study by Tobias and Williamson (1968) also does not provide any evidence for interaction between anxiety and achievement through programmed instruction. The investigators hypothesized that anxious students would profit more from a constructed response programme than they would by reading the programme with response blanks filled in. The subjects of the study were 110 undergraduate students in educational
psychology course. The students are randomly assigned to one of the three response mode conditions - constructed response mode, reading the programme with the response blanks filled in and constructed response without reinforcement. A ninety frame linear programme on binary numbers developed by Silberman and Alter (1961) was used for the study.

An extensive study conducted with anxiety and two treatment methods - traditional and programmed learning was that of Ripple, Hillman and Glock (1969). The analysis of variance revealed no statistically significant interaction between anxiety and treatment methods employed.

Tobias and Abramson (1971) in a study to investigate the interaction among anxiety, response modes and familiarity of subject matter on achievement from programmed instruction found with the help of multiple linear regression analysis that there was no statistically significant relationship between anxiety and achievement either through constructed response modes, with or without reinforcement or to a reading condition. The sample of their study was 144 students recruited primarily from educational psychology course.

Kapadia (1972) investigated the relationship between some personality variables including anxiety and achievement through linear and branching programmed instructional styles.
The sample of this study consisted of 525 students of class eighth. Both immediate and retention scores were employed as a measure of achievement. The partial correlation between each of the personality variable (partialling out the remaining) and each of the achievement variable showed that anxiety was negatively related to achievement (immediate and retention) on linear programmes but there was no significant relationship between anxiety and the two achievement measures on branching programmes.

Dowaliby, Fred and Schumer (1973) in a study with junior college students enrolled in two separate sections of an introductory psychology course arrived at a conclusion that while the teacher centered method (lecture method) optimizing learning for high anxious group, the student centered method (discussion method) resulted in higher examination performance for low anxious group. The result showed overall significant disordinal interaction.

The effect of mode of responding to computer assisted instruction, and anxiety on achievement were studied by Tobias (1973). The subject consisted of 121 students recruited from the general psychology course. These students were randomly assigned to the instructional programme under neutral or distraction conditions and to either a constructed response mode with feedback or a reading condition. The multiple linear regression analysis
of the data revealed no significant interaction between anxiety and response mode.

Papey, Costello, Hedl and Spielberger (1975) attempted to analyse the learner characteristics of state and trait anxiety in determining the effectiveness of individualized multiage classroom (IMP) instruction and traditional instruction. The first grade pupils with low trait anxiety performed better in IMP situation than in the traditional situation, but the second graders with low trait anxiety performed lower in IMP situation than in the traditional situation. Thus the relation between trait anxiety and achievement through IMP and traditional situation seems to be influenced by the chronological age of the learner.

Trown and Leith (1975) in a study to investigate the personality treatment interaction found that out of the four factors studied (sex, ability, anxiety and extraversion) studies, only the anxiety yielded significant interaction. The study reveals that students with a lower level of anxiety may be assigned to the learner centered (exploratory) method and those at the higher level of anxiety to the teacher centered (supportive) method of teaching for the optimum achievement.

Sheehan and Hambleton (1977) conducted a study with 265 students of ninth grade science employing teacher
directed, media, reading and programmed instructional treatments. Johnson-Neyman analysis (Pathroff, 1964) of the data revealed that out of the many learner variables included in the study a disordinal interaction existed only with test anxiety. The analysis further revealed that students with low level of anxiety profited more through programmed instruction whereas those with high level of anxiety gained more through reading as compared with others.

Patel (1978) in a study comparing auto-instructional programmes for class eighth and traditional classroom teaching for class eighth found that it was high anxious group who achieved better on a programme of Geography when taught through auto-instructional programme in comparison to traditional method.

Hermann and Hinokeman (1978) attempted to study the relative effectiveness of inductive and deductive approach of programming for students with different levels of trait anxiety. The samples used were 299 IXth grade advanced level science students of both the sexes. The subject matter chosen for the study was stoichiometry. The result suggested that for high school chemistry, there was no support for the proposition that students with differing level of trait anxiety should receive instruction with different treatment modes. But Sakmyser (1974) in a
similar study using inductive and deductive programmed instruction materials on chemical equilibrium for high school students obtained a significant interaction between trait anxiety and achievement.

The foregoing review of the studies investigating the interaction between anxiety and treatment mode reveals that in most of the studies low anxiety students achieved higher when taught through structured method of teaching like programmed instruction (Kapadia, 1972; Fapey and others, 1975; Sheehan and Hambleton, 1977; O'Reilly, 1967), student centered method (Dowaliby and others, 1973), exploratory (Trow and Leith, 1975) and guided discovery (Leith, 1969) but high anxiety students seems to profit more from teacher centered (Dowaliby and others, 1973), supportive method (Trow and Leith, 1975) and complete guidance method (Leith, 1969). Some studies have also reported significant and positive relationship between anxiety and programmed instruction (Grime and Allinsmith, 1961; Traweek, 1964; Sakmyser, 1974; Patel, 1978).

However, there have been some studies in which an interaction between anxiety and treatment method is not revealed (Flynn and Morgan, 1966; Lache, 1967; Tobias and Williamson, 1968; Kipple and others, 1960; Tobias and Abrahamson, 1971; Hermann and Hincksman, 1978). A number of reasons have been put forward for this state of affairs.
efficiency in relation to some learner characteristics like extroversion, anxiety and I.Q. found that the coefficient of Pearson correlation was -0.182 for extroversion, which implies that extroverts are not likely to succeed with programmed materials.

Leith (1969) attempted to investigate the interaction between introversion/extroversion and three treatment modes (vis. discovery, guided discovery and complete guidance). He divided the introverts and extroverts into low and high anxiety groups. He did not obtain any significant interaction between the four groups classified on the basis of introversion-extroversion and anxiety (Introversion-high anxiety, Introversion-low anxiety, extroversion-high anxiety and extroversion-low anxiety). His subjects were 64 children of age 10-11 years and the task was set of spatial problems with five principles. But in a study with 78 female adults aged over eighteen years, Leith (1969) obtained a statistically significant interaction of extroversion/introversion and mode of teaching. The study further reveals that extroverts were better in achievement from discovery method than complete guidance method.

Shadbolt and Leith (1969) conducted an experiment to investigate the interaction between extroversion/introversion and two different self instructional
programmed text i.e. reception and discovery learning. His subjects were 211 first year college students aged between 18 and 20. The study revealed a significant interaction on both the immediate and retention achievement scores. The result implies that extroverts achieved better from discovery method in comparison to reception method and vice versa.

Brown (1970) tried to explore the interaction between teaching strategies and extroversion/introversion of early secondary school children. The subject matter was 'definition and elementary algebra of vectors'. The teaching strategies differed mainly in the presentation of rules before the examples and rules after examples. The study revealed that introverts achieved better when rules were presented before examples and extroverts excelled when rules were presented after examples. The overall interaction was significant not only for immediate achievement but also for retention and transfer scores of achievement.

Kapadia (1972) attempted to investigate the interaction between linear and branching programmed instructional styles and introversion/extroversion. He obtained insignificant interaction between introversion/extroversion and immediate and retention scores on the two programming styles (linear and branching). Brown and Leith (1975)
obtained a insignificant interaction between extroversion/introversion and two teaching strategies - teacher centered and student centered. The sample of the study consisted of 432 junior school children.

Greer (1978, attempted to examine the relationship between extroversion/introversion as measured by Junior High School Personality Inventory and achievement through programmed learning and conventional teaching methods. The subjects were 84 eight years old children and the programme used was a Fractious programme published by Internation tutor Machines. The study revealed a significant value coefficient of correlation between extroversion and attainment but this correlation coefficient learned out to be insignificant when partial correlation between extroversion and attainment was calculated, holding I.Q. as a constant. This clearly shows that the apparent relationship between extroversion and attainment through programmed instruction is largely a function of I.Q.

A review of studies investigating the interaction between extroversion/introversion and treatment modes reveals that a fairly large number of the studies have succeeded in establishing a statistically significant interaction (Davis, and Leith, 1967; Leith and Wisdom, 1969; Shadbolt and Leith, 1969; Town, 1970). The overall generalization that can be inferred from these studies is
that introverts are likely to profit from a structured learning situation e.g. programmed learning whereas extroverts profit more from a unstructured learning situation viz. discovery and discussion methods. Some studies have, however, obtained insignificant interaction between extroversion/introversion and different treatment modes (Leith, 1969; Trown and Leith, 1975; Kapadia, 1972; Greer, 1974). The insignificant interaction obtained in the above studies may in part be attributed to the age level of the subjects investigated by them. This contention is based on the studies of Leith (1969) Shadbolt and Leith (1969). The other reasons for insignificant of interaction may be due to difficulty level of the task and subject matter familiarity.

Most of the studies investigating the interaction between personality variables and treatment modes have employed anxiety and extroversion/introversion as personality variables. This seems fairly logical because the variables are likely to effect achievement to a fair degree. However, some studies have also employed other personality variables like achievement motivation or mood achievement, neuroticism, study habit, self sufficiency and others.
INTERACTION BETWEEN ACHIEVEMENT MOTIVATION/ NEED ACHIEVEMENT AND TREATMENT NOLES:

Atkinson and Reitman (1956) conducted a study to investigate the interaction between motive strength and achievement through achievement orientation treatment and multi-incentive treatment. He found that students with low motive strength achieved better with the achievement orientation treatment in comparison to multi-incentive treatment, in which students with high motive strength turn out to be high achiever.

Koeing and Okekeachie (1959) conducted a study to show the interaction between need achievement and two treatment methods i.e. independent study and lecture method. The study revealed that women high in need for achievement preferred independent study to lecture method.

Loty and Loty (1964) investigated the interaction between few personality characteristics including achievement motivation and achievement through programmed instruction. The sample comprised of 100 college undergraduates. The achievement motivation as measured by Edward's Personal Preference Schedule, showed insignificant interaction.

The subject matter was 1507 frames programme on physiological psychology. Similarly Sheehan and Ramsden (1977) performed a study with four treatment methods viz. teacher directed, media reading and programmed instruction. With a
test of Junior Index of Motivation, the study did not reveal any significant interaction of achievement motivation to treatment methods used in the study.

Light and Sassenrath (1966) in a study with 150 undergraduate pupils showed that high achievement motivated students learned more efficiently through programmed learning than low achievement motivated students on all the three criteria of immediate, retention and transfer learning scores.

Pandya (1974) carried out a study to determine the relationship between achievement motivation and the amount of learning occurred through programmed learning on a group of 10th class students on a topic of 'light'. The analysis of variance and covariance of the data revealed that the programmed learning situation was more challenging to low motivated pupils than to highly motivated pupils. Govinda (1976) while investigating the effectiveness of programmed learning against structured lecture method found that academic motivation had no definite effect on achievement through either programmed or lecture method.

Kuruvilla (1977) conducted an investigation to study the relationship between achievement motivation and students' achievement through different styles of programming (linear overt, branching skip and response prompt).
The population under study consisted of 304 VIIIth class students from an English medium school. The analysis revealed that there was no significant relationship between academic motivation and performance of student after post test.

Sananwal (1978) conducted a study to find out the relationship between achievement through programmed learning and academic motivation and also compared the achievement of students of high, average and low academic motivation by taking intelligence and English language comprehension as covariates on a sample of 24 M.A. and 43 B.E. students. The analysis revealed that the achievement of students through programmed learning was not significantly related with academic motivation.

Patel (1978) conducted a study on a subject unit of geography for class VIII and compare the achievement of pupils having high and poor need achievement and learning through programmed instruction and traditional way of teaching. The study revealed that pupils with high need achievement proved themselves superior in achievement through programmed instruction in comparison to traditional one.

The above review of studies investigating the interaction between achievement motivation and different treatment methods clearly shows that this variable has
played very significant role in achievement specially through auto-instructional methods like programmed learning in most of the studies (Atkinson and Weitman, 1956; Coe and C. E. echie, 1959; Kight and Sarsenrath, 1966; Pandaya, 1974; Patel, 1978). However, some studies (Loty and Loty, 1964; Sheehan and Hambleton, 1977; Govinda, 1976; uruvilla, 1977, Jansanwal, 1978) have failed to arrive at such a significant relationship. This perhaps seems to be due to the measures of motivation adopted by them.

INTERACTION BETWEEN NEUROTICISM AND TREATMENT MODES:

Crocker and others (1976) conducted a study to investigate the relationship between neuroticism, as measured by 'Lysenck Jr. Personality Inventory' and achievement through structured and unstructured modes of teaching science process activities. The unstructured mode was defined as one in which the teacher controlled only the area of investigation and the supply of apparatus whereas in structured mode the teacher also controlled the specific arrangements of apparatus, the specific variables of investigation, the number and type of measurement to make and analysis procedures. The sample of the study was 120 sixth grade pupils. The analysis revealed a significant interaction between neuroticism and treatment mode.
Seddon (1977) conducted a follow up study to investigate the interaction between neuroticism and achievement through a self instructional chemistry programme. The sample of the study was 741 students of different age. The result showed a insignificant interaction between neuroticism and achievement through the self instructional programme. Greer (1978) attempted to examine the relationship between neuroticism as measured by 'Junior Eysenck Personality Inventory' and achievement through programmed learning and conventional method. The subjects were 84 eight year old children and the programme used was a 'Fraction' programme published by International Tutor achine. This study also revealed a insignificant interaction between neuroticism and achievement through programmed or conventional method of teaching.

From the above review of studies it can be very easily inferred that the study of Crocker and others (1976) revealed a significant interaction whereas the others (Greer, 1978; Seddon, 1977) have failed to note a significant interaction between neuroticism and treatment methods employed.

INTERACTION BETWEEN OTHER VARIABLES AND TREATMENT MOLES:

Wise (1951) conducted a study to find out the relationship between independence and achievement through
permissive and directive teaching methods in a introductory psychology course. He concluded that independent group of students achieved more from permissive teaching in comparison to directive method of teaching.

McCullough and Vanattai (1958) in a study of investigating the interaction between rigid and in need of social supports students and achievement through independent study method found that independent study method facilitate in more achievement gain of less rigid and less in need of social support students in comparison to those who were high on these characteristics.

Reach (1960) studied the relationship between sociability and achievement through four different kinds of learning situations - a lecture, discussion group with instructor, discussion without instructor and an independent study group. The study revealed that highly social group performed better through discussion method whereas students who were not social, performed better through lecture method.

Loty and Loty (1964) conducted a study with 100 undergraduate students to investigate the relationship between student characteristics including social need and achievement through programmed instructional method. The study revealed a significant correlation between social need and achievement through programmed instructional method when
effect of grade point average (a measure of previous achievement) was partialled out.

Kapadia (1972) in a study with 525 students of standard VIII found that score of self sufficiency and achievement on both types of programmes (linear and branching) did not correlate significantly.

Patel (1975) attempted to investigate the effectiveness of auto-instructional programme and conventional method in geometry for students belonging to different socio-economic levels. The study did not reveal any interaction between socio-economic status and learning through the two instructional treatment modes employed.

Sheehan and Hambleton (1977) in a study to adopt instructional method according to the different student characteristics in an individualized science programme found that different levels of study habit did not call for different instructional method. The instructional methods were teacher directed, media, reading and programmed instruction. But Patel (1978) concluded contrariwise. He found that pupils with good study habit achieved better when taught through programmed instructional approach in comparison to traditional method. The subject matter under study was geometry of class VIIIth.

A review of studies investigating the interaction
between different personality, mental ability and other variables reveals that these studies have not been able to arrive at well defined conclusions. Their findings are inconsistent and contradictory. This state of affairs may be due to a variety of factors including small and poor sample, defective tools, lack of controls and variety of treatment modes employed. Therefore, studies with better designs and appropriate treatment modes be attempted for dependable and reliable conclusion.
REFERENCES:


41. Kapadia, B.N. To develop programed learning material and study pupils achievement on programed learning material in relation to some personality variables, Ph.D. M.S.U., 1972.


46. "Doran, J. Differential Response to Inductive and
   Deductive Instructional Procedures, J. Educ.

47. Kuruvilla, A. An experimental study of Programming
   Instructional Materials in the Classroom, J. Educ.

48. Sache, T. Auto-Instructional Response Mode and Anxiety as
   Factor in the Retention of Simple Verbal

49. Keith, C. O. Learning and Personality. In W. K. J. and
   Y. H. (eds.) Aspects of Educational Technology,

50. Keith, C. O. The Effects of Extroversion and Method of
   Programming Instruction on Achievement, Educ.

51. Himbert, H. and others. Experimental Folklore and Experi-
   mentation, the Study of Programmed Learning
   in the Wapakona Public Schools, J. Educ.

52. MacDonald, J. and Rath, J. Should We Group by Creative

53. Collough, H. and Venattai, Experimental Evaluation of
   Teaching Programmes Utilising a Block of

54. Connell, D. Discovery Via Authoritative Identification
   in the Learning of Children, Univ. of Iowa,

55. eled and others. Cognitive Style and Mathematics Learning:
   The Interaction of Field Dependence and
   Instructional Treatment in Numeration System.

56. slope, J. Analysis of Attitude, Achievement and Student
   Profiles as a Result of Individualized
   Instruction in Mathematics, Ph.D. Dissertation
   Univ. of 'tEtranka, Dissertation Abstracts, 1973,
   33.

57. abar, C. Utilization of Learning by Different Teaching
   Methods at Various Levels of Intelligence,


64. Iatel, J. To Develop Auto-Instructional Programmes in Geometry for Students of Xth and to Find Out the Effectiveness in Relation to Different Variables. Pr. (Ed.), Gujarat University, 1975.


68. AI, C. Intelligence as Related to Achievement in General Science Taught by Two Different Methods, Indian Psychological Rev., 1967, 4(1), 71-76.
69. eed, J, and auman, J.J. An experimental involving the
time of 'English-2600' in Automated instruction
ext, J. adul. educ., 1962, 55, 9, 470-484.

70. ipple, H., ilman, J. and block, C.M. Learner Characteri-
istics of Instructional Code: A search for
bordinal Interaction, J. adul. educ., 1969, 60,
113-126.

71. ahan, -. the relative effectiveness of teaching Methods
on Children's Understanding of the Classification
of living organisms at two levels of
ntelligence, J. int. educ., 1974, 21, 221-223.

72. ayen, -. teaching Methods, Intelligence and Gender
actors in pupil's Achievement of Classification

73. ekre, -. A comparison of Inductive and Deductive
rogrammed Instruction on chemical equilibrium
or high school chemistry students, J. educ. in
sci. teaching, 1974, 11, 67-77.

74. sansanwal, -. An experimental study in Programmed
earning for Teaching Research Methodology
ourse at the level, J. educ. educ., 1978.

75. anson, -.andler, -. and heasall, C.J. The effect
of Differential Instructions on Anxiety and
earning, J. educ. educ., 1952, 47, 461-465.

76. eddan, -. The effect of Chronological age on the
relationship of Academic Achievement with
roversion and Neurticism: A follow up study,

77. Shadbolt, J.L., and Leith, C. J. Rates of Learning and
ersonality, 11, irvinghai, National Centre of Programmed learning, 1967.

78. aha, -. A review on equation solving, Deptt. of
ychological Foundations, New Delhi, 1969.

79. heehan, -. and Bamberton, C.J. Adopting Instruction to
student Differences in an Individualized
ence program, J. educ. sci. teaching, 1977, 14, 1, 27-32.

80. lberman, -. et al. Fixed sequence v/s branching auto-
strucational Methods, J. educ. educ., 1961,
52(3), 166-172.


