CHAPTER I
INTRODUCTION

“Learning is the acquisition of habits, knowledge and attitudes. It involves new ways of doing things, and it operates in an individual’s attempt to overcome obstacles or to adjust to new situations. It represents progressive changes in behaviour..... it enables him to satisfy interests to attain goals”.


1.1 CONCEPT OF LEARNING

Learning occupies a very important place in human life. It is a lifelong process. Learning is said to be equivalent to change, modification, development, improvement and adjustment. It is not confined to school learning, cycling, reading, writing or typing but it is comprehensive term which leaves a permanent effect or impression on the individuals. Man is a rational animal. He has got the power of reasoning. This power enables him to learn things quickly. Learning plays a very important role in determining behaviour of an individual. It is the basis of success in life. The miracles of present day civilization are the result of learning. Learning occupies very important role in the field of education. We want to educate the students and it is only learning which is education.

In order to develop presentation and communication techniques that facilitate effective learning, a teacher must have some notions how pupils learn. Course lectures and school experiences add to and reveal the very great differences in how individuals learn. Human behaviour, motivation, achievement, personality and self-esteem, have impact on the activity of learning.

1.1.1 Characteristics of Learning

1. Learning brings progressive change in behaviour as individual reacts to the situation.

2. Learning is universal in nature.

3. Learning is goal directed. When the purpose is more clear, vivid and explicit, the learning becomes meaningful and effective.
4. Learning is active and creative. Learning largely depends upon the activities of the learner. No learning can take place where there is no self activity. Learning is said to be the result of activity and experience. It is creative experience of all knowledge.

5. Learning is transferable. Transference takes place in learning but amount of transfer may vary. Transfer occurs when there is similarity of content, techniques, ideas, procedure and attitudes.

6. Learning is possible on cognitive, affective and conative sides. Acquisition of knowledge is cognitive, modification of emotions is affective and acquisition of habits is conative.

7. Learning is a process and not product.

8. Learning involves new ways of doing things but there is no limit of adopting these ways and means. All learning does not take place in the same manner. Therefore, learning as a process is of different types and involves different methods.

9. Learning is continuous process and not restricted to childhood period. It goes with life. Death is its end point.

10. Learning does not include changes in behaviour on account of maturation, fatigue, illness or drugs etc.

1.1.2 Active Learning

Active learning occurs when the pupil has some responsibility for the development of the activity. Supporters of this approach recognize that a sense of ownership and personal involvement is the key to successful learning. Active learning can be defined as purposeful interaction with ideas, concepts and can involve reading, writing, listening, talking or working with tools, equipment and material such as paint, wood, chemicals etc. In a simple sense, it is learning by doing.

Active learning is contrasted with experiential learning. Experiential learning is also learning by doing but with the additional feature of reflection upon both action and the results of the action.
Active learning strategies benefit both teachers and pupils. As a teacher, they enable to spend more time with groups or individuals which allows better quality assessment to take place. For the pupils’ activity method encourage autonomous learning and problem solving skills, important to both academic and vocationally based work. The advantages of active learning to pupils include greater personal satisfaction, more interaction with peers and opportunities to all members of the class to contribute and respond. It encourages mutual respect and appreciation of the viewpoint of others. Active learning is supportive of co-operative learning, not competitive learning.

Active learning methods promote habits of learning which, it is hoped, are valuable in the workplace, in the home, and which generally enhance pupils’ capacity to cope with everyday life. School can be a place where pupils learn to do things well and in a certain ways. Skills are developed which are used throughout life. Pupils learn to consult a dictionary in order to find feeling or to counteract poor spellings. These skills become habits capable of reinforcement and development. Reinforcement leads to improved performance.

**1.1.3 Advantages of Active Learning Methods**

1. Pupils co-operate with other learners.
2. Group work is often used.
3. Teachers use a greater variety of teaching methods.
4. The learner ‘owns’ the ideas and the product.
5. The learner contributes ideas to the development of work.
6. The learner is active in his own learning.
7. The responsibility of learning is shifted to the learner.
8. Self discipline is needed by the learner.
9. Process skills important learning goals.
10. Resource based learning methods are used frequently.

**1.2 CONCEPT OF STYLE**

Styles by contrast, are static and are relatively in-built features of an individual (Riding and Cheema, 1991).
The style is the most pervasive phenomena of the contemporary society. Different writers have used this term in a variety of contexts. However in the field of psychology, it has been used in the context of personality, cognition, communication, motivation, perception, teaching, learning, leadership, decision making and problem solving etc. Thus the concept of style has been most often used to indicate an individual’s quality or behaviour sustained over the time. It represents a distinct notion of coherent similarity in a variety of context.

1.2.1 Brief History of Styles
Historically speaking, the term ‘styles’ appeared in the literature for the first time in 1921 in the literature of Carljung on psychological types. Thereafter the word ‘style’ was used by G.W. Allport in his work in 1930. Since Allport’s time the term has been modified and imbued with different meanings.

The core definition of style is that, its reference to habitual pattern or preferred ways of doing something that are consistence over long period of time and across many areas of activity, remains virtually same. Grigorenko and Sternberg (1995) traced three main traditions of style based on work in psychology. They called them cognition centered approach, personality centered approach and activity centered approach.

1.2.2 Characteristics of Style
Sternberg (1995) has enumerated fifteen characteristics of styles:
1. Styles are preferences in the use of abilities, not abilities in themselves.
2. A match between styles and abilities creates a synergy that is more than the sum of its parts.
3. Life choices need to fit styles as well as abilities.
4. People have profiles of styles, not just a single style.
5. Styles are variables across tasks and situations.
6. People differ in the strength of their preferences.
7. People differ in the stylistic flexibility.
8. Styles are socialized.
9. Styles can vary across the life span.
10. Styles are measurable.
11. Styles are teachable.
12. Styles are not, on average, good or bad.
13. We confuse stylistic fill with levels of abilities.
14. Styles valued at one place may not value in another.
15. Styles valued at one time may not value in another.

There are different types of styles like – cognitive style, personality centered styles, decision making styles, intellective styles and creative styles. The term learning styles has been extensively used.

1.3 LEARNING STYLES

Psychologists argue that a cognitive or learning style is considered to be fairly fixed characteristic of an individual, which may be distinguished from learning strategies, which are the ways learners cope with the situations and tasks.

Understanding how in-built features of learners affect the way they process information is important for teachers. Riding and Rayner (1998) have proposed that the various conceptualizations may be grouped into two principle cognitive styles:

1. Wholistic- Analytic Style- whether an individual process information in wholes (wholist) or in parts (analytic);
2. Verbal-Imaginary Style- whether an individual is inclined to represent information during thinking verbally (verbalist) or in mental pictures (images). Learning styles can be defined, classified and identified in many different ways. Generally they are overall patterns that provide direction to teaching and learning. Learning styles can also be described as a set of factors, behaviours and attitudes that facilitate learning for an individual in a learning situation (Brown and Mayden 1980). There is no one right way to learn or teach, but there are certain styles of learning that are more appropriate for a given
situation. Thus, when an individual learns, the style may be
unique to the task.

Judith Reiff (1992) has classified learning styles into three
major areas as follows:

1. Cognition
2. Affective
3. Physiological

Cognitive style refers to the way a person perceives, remembers,
thinks, solve problems etc. He distinguishes cognitive style from
general abilities by asserting that style focuses on ‘how I learn’ and
abilities focuses on ‘what I learn’. Style is bipolar or on a continuum
i.e. sequential to global. Abilities are unipolar or measured with a
single score such as percentile, average or poor; style score or style
characteristics are not right or wrong.

Affective components of learning styles include personality and
emotional characteristics related to areas such as persistence, locus of
control, responsibility, motivation and peer interaction.

The physiological component is basically based and related to
sex differences, nutrition and reaction to physical environment.

In both education and training, an important aspect of the
design, development and delivery of learning is the selection of
instructional methods, media and assessment strategies. Moreover as
a result of advances, instructional technologies, the range of methods
and media available to teachers and learners has increased.
Proponents of the concepts of learning styles have been advocating
that every learner or trainee has his unique style of learning which
enables him to learn best. Therefore for making improvement in
teaching learning process, teacher need to diagnose the style of
learning of his students and to prescribe them instructional treatment
matching their learning styles.

1.3.1 Development of the Concept of Learning Style

The development of the concept of learning style may be
summarized on the basis of the following theories:
1. Information Processing Theory

The concepts from information processing theory have found their way into the concepts of learning style.

2. Aptitude-Treatment Interaction

Aptitude-treatment interaction (ATI) research is a systematic attempt to relate individual differences to aptitude including aspects of cognitive and affective styles to instructional method.

3. Behaviouristic Theories of Learning

Behaviouristic theories of learning have contributed a lot towards the development of the concept of learning style. The researchers of this tradition describe learning style as learner's behaviour and action.

1.3.2 Definition of Learning Style

Life is a sequence of act of learning of feelings, ideas, attitudes etc. Learning is nothing but a permanent change in behaviour that occurs as result of experience in the environment. Each learner's personality is unique in one's approach to a variety of learning tasks and one's chosen way of taking a particular task is also unique. Learning depends upon the individual's learning style. In other words, the way which a child is best able to learn visually, orally, by motor activities or a combination of these depends on the child’s learning style. Psychologists and researchers have defined the term learning style in different ways depending upon their theoretical formulations. Following are the definitions given by the different authors:

Sigel and Coop (1974) have viewed learning style as an integral concept that bridges the personality cognitive dimension of the individuals.

Gibson (1976) argues that learning style and cognitive style are synonymous.

Letteri (1980) states that learning style refers of the style of information processing, the storage and retrieval of information.

Kelbeck (1989) said that learning style can be understood as a person's preferred approach to information processing, idea formation...
and decision making situations all depend on the compatibility with the personal profiles.

Debellow (1990) define the learning style as the way people absorb, process and retain information.

Reiff (1994) holds that learning style can be described as a set of factors, behaviours and attitudes that facilitates learning for a student in a given situation.

Messick (1994) defines that learning styles are consistent orientations towards learning and studying.

James and Gardner (1995) state that the ways individual learner’s react to overall learning environment make up the individual’s learning style.

Vermunt (1996) defines learning style as a coherent whole of learning activities that students usually employ.

An over view of various definitions of ‘learning style’ reveals that learning style are consistent preferred ways of learning which the individual learners employ during learning of various tasks.

1.3.3 Types of Learning Styles

There are different types of learning styles some of them are as follows:

Visual (V):

This preference includes the depiction of information in maps, spider diagrams, charts, graphs, flow charts, labelled diagrams, all the symbolic arrows, circles, hierarchies and other devices that people use to represent what could have been presented in words, it does not include still pictures or photographs of reality, movies, videos or power point. It does include designs, patterns, shapes and the different that are used to highlight and convey information. When a whiteboard is used to draw a diagram with meaningful symbols for the relationship between different things that will be helpful for those with a visual preference.
Aural (A):

This perceptual mode describes a preference for information that is ‘heard or spoken’. Learners who have this as their main preference, report that they learn best from lectures, group discussion, radio etc. The aural preference includes talking out loud as well as talking to oneself. Often people with this preference want to sort out things by speaking first, rather than sorting out their ideas and then speaking. They may say again what has already been said, or ask an obvious and previously answered question. They need to say it themselves and they learn through saying it – their way.

Read/Write (R):

This preference is for information displayed as words. Many students and teachers have a strong preference for this mode. This preference emphasizes text-based input-output, reading and writing in all its forms but especially manuals, reports, essays and assignments. People who prefer this modality are often addicted to power-point, the internet, lists, diaries, dictionaries, quotations and words.

Kinesthetic (K):

By definition, this modality refers to the ‘perceptual preference related to the use of experience and practice (simulated or real)’. Although such an experience may invoke other modalities, the key is that people who prefer this mode are connected to reality, ‘either through concrete personal experiences, examples, practice or simulation’. It includes demonstrations, simulations, videos and movies of ‘real’ things, as well as case studies, practice and applications. The key is the reality or concrete nature of the example. If it can be grasped, held, tasted, or felt, it will probably be included. People with this as a strong preference learn from the experience of doing something and they value their own background of experiences and less, so the experiences of other. It is possible to write or speak kinesthetically if the topic is strong based in reality. An assignment that requires the detail of who will do what and when, is suited to those with preference, as is a case study or a working example.
1.3.4 Models of Learning Styles

Related literature reveals that there are number of models which have been developed by psychologists and researches to explain the concept of learning style and also developed instruments to measure them. The three approaches which describe the learning styles as follows:

1. Cognition centered approach
2. Personality centered approach
3. Activity centered approach

1. Cognition Centered Approach

First movement in the history of learning style was called as ‘The Cognition Style Movement’. It came into prominence in the 1950’s and early 1960’s with the ideas that style could provide a bridge between the cognition (e.g. how we perceive, how we learn, how we think) and the personality. The term cognitive style referred to an individual’s way of processing information e.g. field dependence independence as suggested by Herman Witkin, Guilford’s model, Holzman and Klein’s model., Riding’s model.

2. Personality Centered Approach

A second movement has attempted to understand learning style but in a way that more resembles the conceptualization and measurement of personality more than of cognition. Therefore they are levelled as personality centered styles e.g. styles derived by Myers and Myers from the work of C.G. Jung and theory of styles suggested by Anthony Gregorc comes in this category.

3. Activity Centered Style

The third movement to understand learning styles that appear close to behaviour or action of how people like to learn e.g. Kolb’s theory and Dunn and Dunn’s theory come in this category.

GRASHA-RICHMANN’S MODEL OF LEARNING STYLE

Grasha - Richmann’s model of learning style is known as social-interaction model. Thus model was evolved from the interest in individual differences in learning. According to this model an
important model of the study of learning style is to help teacher in conducting classroom activities and in designing learning environment. It permotes understanding of learning styles in broad context, spanning six categories. A brief description of each learning style is given below:

1. **Independent**

   Students with independent learning style prefer independent study, self paced instruction and would prefer to work alone on course projects than with other students.

2. **Dependent**

   Dependent learners look the teacher and peers as a source of structure and guidance and prefer an authority figure to tell them what to do.

3. **Competitive**

   Students with competitive learning style learn in order to perform better than their peers and to receive recognition for their academic accomplishment.

4. **Collaborative**

   Students with this style acquire information by cooperation with teacher and peers. They prefer lectures with small group discussion and group project.

5. **Participant**

   Participant learns are interested in class activities and discussions and are eager to do so much class work as possible. They keenly aware of, and have a desire to meet teacher’s expectations.

6. **Avoidant**

   Students with avoidant learning style are not enthusiastic about attending class contents. They are typically uninterested and are sometimes over whelmed by class activities.

   Grasha (1990) holds that ideally one would have a balance of all the learning style preferences. These learning preferences are likely to change as one encounters new life and educational experiences.


**Gregorc’s Learning Style Model**

Learning style, according to this model, are distinctive observable behaviours that provide clues to the functioning of individual’s mind and how they relate to the world. Those mind qualities suggest that individual learn in combination of dualities, specifically, perception and ordering. Abstract, concrete, random and sequential styles have been found to combine into several styles. While everyone may exhibit all the four patterns of learning style to some degree most exhibit inclination for one or two. This model has classified learners in four categories:

1. Concrete sequential learners.
2. Concrete random learners.
3. Abstract sequential learners.

The styles of learning emerge from inborn predispositions and can be encouraged and disciplined.

**Dunn And Dunn’s Learning Style Model**

Kennetch Dunn and Rita Dunn developed a multidimensional model of learning style. It encompasses five dimensions viz. environmental, emotional, sociological, psychological and physical dimensions and contains 21 learning elements. The environmental stimulus includes element of sound, light, temperature and design. Emotionality involves motivation, persistence, responsibility and structure. The sociological stimulus includes the elements of learning alone, in pairs, with pairs, or as a part of team, with an authoritative teacher or in combination of social patterns. Physical elements include perceptual modalities, the need for intake while learning, time of the day, and the need for modality. The psychological dimensions include global/analytic hemisphericity, and impulsive/reflective characteristics.

Prime importance of the tenet of model is that if learner is to be given best opportunity to learn, his individual learning style must be
assessed and instructional techniques must be used that are in consonance with students learning style.

1.3.5 Role of Learning Styles in Education

The role of learning styles in education of school children is of utmost importance. A number of claims have been made by the advocates of learning style. In the following paragraphs, various roles of learning in education have been pointed out in the words of leading personalities in the concerned field.

Dembo (1977) held that certain learning styles may be of even more important than intelligence in affecting classroom learning. The identification of these styles should be of particular importance for educators, as those variables in classification of students may help teacher to optimize the match between teaching and type of students.

Gribbs (1981) asserts that “a thorough understanding of students’ learning style can help counselors to develop strategies, techniques and programmes that are responsive to unique learning needs.”

Keefe (1982) states that “the key of effective schooling is to understand the range of student learning style and to design instructions and material that respond directly to individual’s learning needs.”

Dunn (1978) asserted that “there is no reason in the world not to diagnose the learning styles of every student and provide guidelines and alternatives for teaching them through their individual strengths.”

Judith Reiff (1992) has given the following points for the importance of learning styles:

1. A better understanding of self learning style can help teachers in reducing frustration for themselves and their students.
2. A matching instruction with learning style of children can result in higher achievement, a more positive attitude and improved self-concept and self confidence.
3. The teacher with learning style knowledge can plan more appropriate lessons to accommodate a variety of learning styles.
of learners in a classroom. Planning appropriate and varied lessons will improve both instruction and management.

4. The overview of learning style research and terminology can provide a theoretical basis for versatile teaching. The effective teachers can demonstrate flexibility by using a variety of instructional techniques in the classroom.

5. Teachers need to share teaching style information with administrators, counsellors, special education teachers and other staff. A co-operative team efforts is always more effective.

To sum up, it may be stated that learning style concept provides a new prospective for teachers, students, administrators, curriculum designers, guidance workers and parents. It is a new way of looking at learning and instruction, offers a deeper and most profound complexion of the learner than know previously. It is basic framework upon which theory and practice can be built. All types of learners at all stages (from pre-primary to university) can be benefited from the understanding of their learning styles.

1.4 CONCEPT OF LOCUS OF CONTROL

Perception of control is a provincial concern, learning theorists with interest in the investigation of fear and stress, social psychologists who experiment with attribution process and clinical psychologists attempting to cope with their patients helplessness and lack of confidence, have all contributed to growing literature dealing with perception of control. The largest body empirical data about perceived control, however, drives from Rotter’s “Social Learning Theory”. In Rotter’s theory, a person’s actions are predicted on the basis of his values, his expectations and the situations in which he finds himself.

The construct defined as ‘Locus of Control’ first came in prominence with the publication of a monograph by Rotter’s in 1966. In this publication Rotter presented the scale he had developed to assess the individual’s generalized expectancies or internal versus external control of reinforcement. This instrument was constructed
within the content of reinforcement following some behavior which is not simple stamping in process but depends upon whether or not the person perceives a causal relationship between his behavior and the reward. In Rotter’s theory, the external-internal dimension is considered on expectancy variable within a social learning model which basically describes behavior as a function of expectancies, reinforcement and the impact of psychological situations. According to him, a person’s behavior is directional or goal-oriented.

The formulation for predicting behavior at a specific situation, time and place is;

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BP_x, SI, Ra = f(Ex.Ra,SI & Ra, SI)
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This formula reads as; the potential for behavior ‘X’ to occur in the situation ‘I’, in relation to reinforcement ‘a’, is a function of expectancy of the occurrence of reinforcement ‘a’, following behavior ‘X’ and the value of the reinforcement in situation ‘I’.

Behavior potential may be defined as the potentiality of any behavior occurring to any given situation calculated in relation to any single reinforcement or set of reinforcements. It is a relative concept and one can be preferred to other in a particular situation. In the words of Rotter’s (1966):

“When a reinforcement is perceived by the subject as following some of his own but not entirely contingent upon his action, then it is typically perceived as the result of luck, chance, fate as under control of powerful others, or as unpredictable because of great complexity of the forces surrounding him. When the event is interpreted in this way by an individual we have labelled this belief in external control. If person perceives that the events contingent upon his own behaviour relatively permanent characteristics, we have termed this belief in internal control…….”

Locus of control is an important cognitive style. In other words, it may be stated that locus of control refers to the degree to which an individual sees himself in control of his life and the events that influence it. Simply stated, internal-external locus of control refers to
the degree to which an individual perceives the events that happen to him or her are dependent upon his or her own behaviour or are the result of fate, luck, chance or powers beyond one’s personal understanding.

Those persons who see themselves as exerting significant influence over the locus of their own lives are internals. Externals, on the other hand, tend to believe that events are determined by force outside of themselves.

Research on the personality dimension of locus of control (I-E) first begin in the psychological laboratories of Chio state university in the mid fifties. Since then several studies and articles on the concept have been published which show that individual differences in locus of control are evident in several other fields of perception and intelligence also. The individuals are quite stable in their locus of control dimension with respect to time, age and situation.

It is not the simple registering of success and failure of experiences that are pertinent to the generalized expectancy of ‘I’ vs ‘E’ control, rather it is the interpretation of the cause of these experiences. Such an interpretation differs from the expectation of success or failure in that it is concerned without belief about how reinforcements are determined and should, therefore, provides an independent contribution along with freedom of goal directed activity.

In social learning term the construct, perceived control is referred to as a generalized expectancy of internal or external control of reinforcement. The generalized expectancy of internal control refers to the perception of events, whether positive or negative, as a consequence of one’s own action and thereby potentially under personal control. The generalized expectancy of external control, on the other hand, refers to the perception of positive or negative events as being unrelated to one’s behaviour and are beyond personal control.

In social learning theory, reinforcement acts to strengthen an expectancy that a particular behaviour or event will be followed by
reinforcement sequence is built up, the failure of the reinforcements to occur will reduce or eliminate the expectancy. Expectancies generalized from a specific situation to a series of situations are perceived as related or similar.

Consequently, a generalized expectancy for a class of related events has functional properties and make up one of the important classes or variables in the personality description. A generalized attitude, belief or expectancy regarding the nature of casual relationship between one’s own behaviour and its consequences might affect a variety of behavioral choices in broad band of life situations. These generalized expectancies will be result in a characteristic differences in behavior in a situation, culturally categories as chance Vs skill determined and they may act to produce individual differences within a specific condition (Rotter, 1966).

Expectancy may be defined as the probability held by the individual that a particular reinforcement will occur as a function of a specific situation or situations. Expectancy is systematically independent of the value or importance of the reinforcement. The reinforcement value of any one of a group of potential external reinforcement is ideally defined as the degree of person’s performance for that reinforcement to occur if possibilities of occurrence of all alternation were equal.

The potentialities of occurrence of a set of behaviour that leads to the satisfaction of some need (need potential) is a function of both the expectancies that these behaviour will lead to these reinforcement (freedom of improvement) and the strength or value of these reinforcements (need value). In social learning theory, the construct of locus of control located at the freedom of movement.

Freedom of the movement is generalized expectancy of success. At least three factors will contribute to this expectancy. First, specific experiences in applying previously will be important. Second, how much previous experience of this specific nature, the individual has had. Third, what experiences has he encountered in other situations
that he sees as similar. When freedom of movement is low while need value is high, we have a situation of conflict.

An individual will learn to respond to that behaviour which, under given circumstances, will lead to maximum satisfaction of certain need. The need include: need potential, i.e. likelihood of a particular set of behaviour; expectancy that this behaviour will lead to satisfaction and need value i.e. the relative important of need in hierarchy. The fourth component added to it is ‘psychological situation’ in social learning theory. The psychological situation is that environment or situation (internal or external) by which, person is stimulated and by drawing up past experiences, learns how to derive more satisfaction in any given set of circumstances.

Thus, expectancies in each situation are determined not only by specific experiences in that situation, but also, to some extent, by experiences in other situation which the individual perceives as similar. Generalized expectancies would be most predictive in novel or ambiguous situation and relatively less important when an individual is in a situation similar to the one experienced by him in the past. It is only one of the potential determinants of the human behavior.

Locus of control itself can be recognized as one aspect of broader concept of causal attribution which is receiving increasing attention from many investigators. Perception of control is not a provincials concern. Learning theorists with interests in the investigation of fear and stress and social psychologists who experiment with attribution process and clinic psychologists attempting to cope with their patients helplessness and lack of confidence have all contributed to the growing literature dealing with the perception of control. The largest body of empirical data about perceived control, however, derives from Rotter’s special learning. In Rotter’s theory, a person’s action are predicted on the basis of his values, his expectations and the situations in which he finds himself.

In social learning terms, the construct ‘perceived control’ is reinforcement to as a generalized expectancy of internal or external
control of reinforcement. The generalized expectancy of internal control refer to the perception of events, whether positive or negative as being consequences of one’s own action and there by potentially under personal control. The generalized expectancy of external control refers to the perception of events, as being unrelated to one’s own behaviour and there by beyond personal control.

1.4.1 Sources of Control Expectancies

a) Familial Origins:

Locus of control is learned and acquired. It is not inborn. A child starts learning the laws from early months of life hence mother is responsible for locus of control of children. Family is the unit of society to impart learning of child. Following are some important characteristics:

1. Warm accepting and non-rejecting home.
2. Protection and approval.
3. Independence.
5. Father’s interest in child’s activities.
6. Awareness of behaviour reinforcement contingency

b) Social origins.

c) Age

Locus of control was defined in terms of personal control a person has over the reinforcements and the reward that follow actions and efforts. When a particular event was perceived by an individual as contingent upon his own relatively stable characteristics, this was referred as ‘Internal’ locus of control. On the other hand, when the event was perceived by him as a consequence of some action of his own but not being entirely contingent upon it or is attributed luck, chance, fate or under control by others, such a belief is termed as “external” locus of control.

1.5  NEED AND SIGNIFICANCE OF THE STUDY

Recently, learning style of the students have drawn the attention of many educators and researchers. Many researchers have
expressed that learning style of student is perhaps the single most important factor in his/her academic performance. Learning style have important bearing for classroom teacher, curriculum designer, educational technologist, guidance and counseling workers and even educational administrators.

Individual differences work everywhere in every situation, whether it is personality differences, biological or social differences or it is difference in learning and responding to a specific situation. There is a need to study which factor affects what. The present study aimed at studying whether gender, category and locus of control affect the learning style of the high school students. The findings and the conclusions of the study will be helpful for students to identify and differentiate their own learning style. It will also help the teachers to adopt teaching method according to the learning style of students. The teacher educators can get benefit from this study for teaching prospective teachers to understand different learning styles of students and designing classroom learning activities according to the preferences of their student. The principals and administrators can use finding of study for establishing the system in their institutions which suit to maximize the learning. Policy makers will be benefited by the result of the study for further policy formulations regarding teacher, designing teaching learning aids and taking measures for improvement of classroom environment.

1.6 STATEMENT OF THE PROBLEM

In view of the above discussion, the problem of the study is stated as under:

A STUDY OF LEARNING STYLES OF HIGH SCHOOL STUDENTS IN RELATION TO THEIR GENDER CATEGORY AND LOCUS OF CONTROL.

1.7 OBJECTIVES

Following were the objectives realized in the present study:

1. To study the main effects of gender, category and locus of control on the visual learning style of high school students.
2. To study the double interactional effects of gender x category, gender x locus of control and category x locus of control on the visual learning style of high school students.

3. To study the triple interactional effects of gender x category x locus of control on the visual learning style of high school students.

4. To study the main effects of gender, category and locus of control on the aural learning style of high school students.

5. To study the double interactional effects of gender x category, gender x locus of control and category x locus of control on the aural learning style of high school students.

6. To study the triple interactional effects of gender x category x locus of control on the aural learning style of high school students.

7. To study the main effects of gender, category and locus of control on the read/write learning style of high school students.

8. To study the double interactional effects of gender x category, gender x locus of control and category x locus of control on the read/write learning style of high school students.

9. To study the triple interactional effects of gender x category x locus of control on the read/write learning style of high school students.

10. To study the main effects of gender, category and locus of control on the kinesthetic learning style of high school students.

11. To study the double interactional effects of gender x category, gender x locus of control and category x locus of control on the kinesthetic learning style of high school students.

12. To study the triple interactional effects of gender x category x locus of control on the kinesthetic learning style of high school students.

1.8 **HYPOTHESES**

The following hypotheses were formulated for the present study which were subsequently tested:
1. There will be no significant main effects of gender, category and locus of control on the visual learning style of high school students.

2. There will be no significant double interactional effects of gender x category, gender x locus of control and category x locus of control on the visual learning style of high school students.

3. There will be no significant triple interactional effects of gender x category x locus of control on the visual learning style of high school students.

4. There will be no significant main effects of gender, category and locus of control on the aural learning style of high school students.

5. There will be no significant double interactional effects of gender x category, gender x locus of control and category x locus of control on the aural learning style of high school students.

6. There will be no significant triple interactional effects of gender x category x locus of control on the aural learning style of high school students.

7. There will be no significant main effects of gender, category and locus of control on the read/write learning style of high school students.

8. There will be no significant double interactional effects of gender x category, gender x locus of control and category x locus of control on the read/write learning style of high school students.

9. There will be no significant triple interactional effects of gender x category x locus of control on the read/write learning style of high school students.

10. There will be significant main effects of gender, category and locus of control on the kinesthetic learning style of high school students.

11. There will be no significant double interactional effects of gender x category, gender x locus of control and category x locus of control on the kinesthetic learning style of high school students.
12. There will be no significant triple interactional effects of gender x category x locus of control on the kinesthetic learning style of high school students.

1.9 OPERATIONAL DEFINITION OF THE KEY TERMS

Learning style:
Learning style refer to four learning styles: visual, Aural, Read/write Kinesthetic: as measured by VARK learning style Inventory.

Gender:
Gender refer to male and female students.

Category:
Category refers to SC and non-SC students.

Locus of Control:
Locus of control refers to External and Internal locus of control as measured by Rotter’s locus of control scale.

1.10 DELIMITATIONS OF THE STUDY
The present study was delimited in tem of the following ways
1. The study was restricted to the learning style with reference to gender, category and locus of control.
2. The study was restricted to the investigation of learning style of 9th class students.
3. The study was delimited to the Districts Bilaspur and Shimla of Himachal Pradesh.
4. The study was delimited to the students of government schools only.
CHAPTER II

REVIEW OF RELATED LITERATURE

“The literature in any field forms the foundation upon which all future work will be built. If we fail to build the foundation or knowledge provided by the review of literature our work is likely to be shallow and native and will often duplicate work that has already done better by someone else”.

Borg and Gill (1971)

Review of related research is an important step in conducting an investigation. It extends a lot of facilities to the researcher in sharpening the problem, framing the research hypotheses, reflecting the tools, identifying an appropriate research design and exploring the ground for undertaking the study.

Researchers take advantage of the knowledge, which has accumulated in the past as a result of constant human endeavour. A careful review of the research journals, books, dissertations, theses and other sources of information on the problem to be investigated, is one of the important steps in the planning of any research study.

The review of the related literature enables the researcher to define the limits of his/her field. It helps the researcher to define the limits of his/her problem.

The knowledge of the related literature keep the researcher abreast with the work, which other have done, and thus, facilitates him to state the objectives clearly and concisely.

By reviewing the related literature, the researcher can avoid unfruitful and useless problem areas. Those areas can be selected in which positive findings are likely to add to the knowledge in a meaningful way.

The review of the related literature gives the researcher an understanding of the research methodology, which refers to the way, study is to be conducted. It helps the researcher to know about the tools and instruments, which proved to be useful and promising in the previous studies. The advantage of the related literature is also to
provide insight into the statistical methods through which validity of results is to be established.

Good, barr and scates (1991) have highlighted the purpose of reviewing the literature as:
1. To show whether the evidence already available solves the problem with adequancy, without further investigation, thus, to avoid the risk of duplication.
2. To provide the ideas, theories, explanation of hypotheses valuable in formulating the problem.
3. To suggest methods of research appropriate to the problem.
4. To locate comparative data useful in the interpretation of results.
5. To contribute to the general scholarship of the investigation.

Keeping in view the importance of review of related literature in the conduct of scientific study, the present investigator made an attempt to review the related literature. The present chapter thus provides a critical account of the studies conducted in foreign countries and India on the theme of learning styles.

GENDER AND LEARNING STYLE

Messer (1971) studied the difference in sensory modality learning style of male and female students at each age from ten to fourteen years. The results showed that there were no sex differences in sensory modality learning style.

Stewart (1979) designed a study to investigate the differences in preferred learning styles between talented students and the students of the general population. Sex variable was also examined in relation to learning style preferences. Analysis of the data showed that sex significantly affects learning style preferences.

Caskey (1981) did find significant sex differences in learning style of community college students as measured by Kolb’s learning style Inventory.
Laverne (1981) concluded that there was no significant relationship between gender of second language students and their learning style preferences.

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

Hopkin (1982) investigated the learning style of traditional students, age 18-22, and non-traditional students, age 25 and above, enrolled in under graduate study. The results of the study showed that females indicated preferences for the dependent, participatory and collaborative style, while males exhibited preferences for the avoidant, independent and competitive style.

Tucker (1983) carried out a study to determine if any significant differences exist in learning style of selected eight grade students suing gender and race as the independent variable. The result of the study indicated that boys scored significantly higher than girls on the Abstract Conceptualization Scale. The data further revealed a significant difference between the sexes on the AE-CE combined scale (Abstract Conceptualization and Concrete Experience) on the other hand, males showed preference for abstract over concrete abilities. The females showed preference for concrete over abstract abilities.

Moore (1984) analyzed the learning style preferences of non-traditional under graduate students at a private four year college. The major findings of the study were:

1. Females to a greater extent preferred structure in term of organization and details in the learning situation than the males. Females wanted to know precisely what was expected in the learning situation but not in the authoritarian manner.
2. Males preferred content that involves practical computational skill in working with the things, while females preferred conventional activities involving other people.

Pederson (1984) observed that there was no relationship between the gender variable with regard to learning style preferences.

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

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

Westhafer (1985) designed a study to assess preferred learning style of high school students. Factor examined in this study included gender along with other variables. Analysis of data revealed that females demonstrate a significantly higher preference for project, simulations, peer teaching, discussions, teaching games, programmed instruction and lecture than male students.

Diaz (1986) probed into preferred learning style of community college career and transform students based on the results of study it was concluded that female students have greater interest than male students for the following areas: qualitative, people and listening. Male students, on the other hand, have greater interest than female students for the inanimate.

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

**Simmons (1986)** while investigating the relationship among modalities, academic achievement and the sex of 6th grade students found that no significant relationships exists between sex and learning style modalities.

**Singh (1987)** observed that high school boys show more preference for quite atmosphere and dim light than girls. Girls have more liking for group work than boys. They liked to study more in pairs than their counter part. Boys had shown liking for auditory experiences than girls.

**Balesh Kumari and Vema (1988)** examined that learning style preferences of senior secondary students in relation to their gender. The outcome of the study exposed that there were gender differences in case of three sets of the learning style. Male students exhibited stronger preferences for individualistic learning style while female students demonstrated more field-independent and environment orientation learning style. The investigator concluded that gender differences are partly related with learning style preferences.

**Adenuga (1989)** designed a study to investigate the relationship between gender of adult American and foreign students and their learning study preferences. The results showed that gender have no predictive capability for either self-directed learning readiness or preferences for experimental learning style.

**Johnson (1989)** provide a comparative analysis of the learning style of the black and white college freshmen. The independent variables were: race, gender, point average size of high school were included in this study. The results revealed that females and males were found to differ significantly on the seeing/institution sub-scale of the LSI with females being more “seeing” than males. No significant differences in learning style, as measured in this study, were found between students graduating from small, medium or large high school. The race gender interactions were also not significant.
**Titus, Thomus, Bengandi and Mansha (1990)** reported that female adolescents were more concretely oriented. They also found that slow learners were more reflective, more active and less abstract.

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

**Soliday (1992)** designed a study to investigate the differences in preferred learning style between vocational education and non-vocational secondary students. No differences in learning styles were found to exist between vocational technical education secondary students on the basis of gender. Significant differences found to exist between the learning style of vocational technical students.

**RACE/ETHNICITY AND LEARNING STYLES**

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

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

**Jonson (1989)** made a comparative analysis of learning styles of black and white college freshmen. On Kolb’s learning style inventory, blacks as a group used the assimilator mode of processing information as compared to whites who used the diverger learning modality to a great extent.

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

**Argon (1996)** reported that several significant differences were found between native American and Hispanic adults learning using
nine instruments for assessing learning styles and cognitive styles including Kolb’s Learning Styles Inventory.

**Gallagher (1998)** explored that differences in learning styles using Kolb’s Learning Styles Inventory in adult and tractional age students style at selected universities. Ethnicity did not emerge as significant factor with reference to differences in learning styles.

**William (2001)** reported that there were no significant differences in learning styles of men and women community college students when learning styles were assessed by Kolb’s Learning Style Inventory. The differences between race/ethnicity categories however, were noted in learning mode characteristics.

**LOCUS OF CONTROL AND LEARNING STYLES**

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

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

**Pandian (1983)** found that learning styles of college students measured through Grasha-Richmann’s students learning style scale, were found to be associated with locus of control.

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

**Diskowski (1991)** explored that nature and degree of relationship among principal’s locus of control, their learning style and school effectiveness. The subjects responded to three
instruments- Rotter’s Locus of Control Scale, the Gregorc’s style Delineator and researcher designed demographic questionnaire. The findings revealed that no statistically significant difference was found between locus of control and learning style.

Jonassen and Grabowski (1993) responded that externals were more avoidant and non-participant than internals.

Verma (1994) made an attempt to ascertain whether learning modes and learning styles of university students differed as a function of their locus of control. The results revealed that students with internal and external locus of control were found to be similar with respect to four learning modes viz., concrete experience, abstract conceptualization, reflective observation and active experimentation. They were found alike with regard to four learning styles namely: diverger, converger, assimilator and accommodator learning style.

It seems from the review of literature that many studies were conducted on the learning style of students at different levels. Some of the studies have been tried to find out the effects of gender, category and locus of control on the learning styles of students at different levels. Messer (1971), Sterward (1979), Moore (1984), Grun (1986), Johnson (1989), Houston (1993), Hansen (2000), Williams (2001) all of these studied the effects of gender on the learning style of students at different levels.

Murphy (1980), Diskowski (1991), Verma (1994) studied the effects of locus of control on the learning styles of students at different levels. Similarly Caskey (1981), Flores-Fist (1995), Argon (1996), Williams (2001) studied the effects of race/ethnicity on the learning styles of high school students at different levels. Thus one thing become clear that gender, category and locus of control accounted for significant differences in learning styles. But these variables were less researched in context of high school students. Hence the investigator thought it worthwhile to study the learning styles of high school students across gender, category and locus of control to fill the gap between past studies and present situations.
CHAPTER III
METHODOLOGY AND PROCEDURE

The present study was designed to investigate the learning styles of high school students in relation to gender, category and locus of control.

This chapter presents the description of research method, sample, tools used, data collection and statistical techniques used.

3.1 RESEARCH METHOD

Methodology has to be the most important aspect towards any study. By method we mean systematic approach towards a particular phenomena. Methodology used in any investigation, in fact, determines its testing. For the conduct of the present study, Descriptive survey method was used.

According to Best and Kahn (1996) a descriptive study describes and interprets what is. It is concerned with the conditions or relationships that exist, opinions that are held, processes that are going on, effects that are evident, or trends that are developing. It is primarily concerned with the present, although it often considers past events and influences as they relate to current conditions. This method is most commonly used in educational endeavor.

The descriptive studies, while making use of survey method, provide information useful to the solution of local problems and provides data to form the basis of research of more fundamental nature.

3.2 SAMPLE

The population of the present study comprised of high school students of Himachal Pradesh. The sample was taken from 8 schools of Swarghat and Sader blocks of Bilaspur district and 9 schools of municipality area of Shimla district. Total sample of students was 340 initially. The high schools from each district were selected conveniently. The students from each school were selected randomly.
3.2.1 Distribution of Sample

The distribution of the sample is shown as below:

Table-3.1

Distribution of the Sample

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of the School</th>
<th>Number of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>1.</td>
<td>GGSSS Bilaspur</td>
<td>0</td>
</tr>
<tr>
<td>2.</td>
<td>GBSSS Bilaspur</td>
<td>20</td>
</tr>
<tr>
<td>3.</td>
<td>GSSS Zakatkhana</td>
<td>10</td>
</tr>
<tr>
<td>4.</td>
<td>GSSS Rishikesh</td>
<td>10</td>
</tr>
<tr>
<td>5.</td>
<td>GSSS Swarghat</td>
<td>10</td>
</tr>
<tr>
<td>6.</td>
<td>GSSS Tanboul</td>
<td>10</td>
</tr>
<tr>
<td>7.</td>
<td>GHS Thuran</td>
<td>10</td>
</tr>
<tr>
<td>8.</td>
<td>GSSS Swahen</td>
<td>10</td>
</tr>
<tr>
<td>9.</td>
<td>GSSS Phagli</td>
<td>10</td>
</tr>
<tr>
<td>10.</td>
<td>GSSS Summer Hill</td>
<td>10</td>
</tr>
<tr>
<td>11.</td>
<td>GSSS Sanjauli</td>
<td>10</td>
</tr>
<tr>
<td>12.</td>
<td>GSSS Boileauganj</td>
<td>10</td>
</tr>
<tr>
<td>13.</td>
<td>GSSS Tutikandi</td>
<td>10</td>
</tr>
<tr>
<td>14.</td>
<td>GGSSS Lakkar Bazaar</td>
<td>0</td>
</tr>
<tr>
<td>15.</td>
<td>GBSSS Lalapani</td>
<td>20</td>
</tr>
<tr>
<td>16.</td>
<td>GSSS Totu</td>
<td>10</td>
</tr>
<tr>
<td>17.</td>
<td>GSSS Khalini</td>
<td>10</td>
</tr>
</tbody>
</table>

3.2.2 Design of Sample

Only 176 students can be included in the final sample out of 340 students taken initially. The 176 students (Boys and Girls) were selected on the basis of locus of control score computed to identify (Boys and Girls) who scored M+3/4 S.D. above assigned to external group and those who scored M-3/4 S.D. below were assigned to internal group. The design of sample is given below:
3.3 TOOL OF DATA COLLECTION

Every research is processed through certain well-defined tools. Tools help the researcher to gather data. The type of information gathered by researcher depends on the kind of tools used for the purpose. The selection of the tools depends upon the objectives and design of the study. For the collection of necessary information for the present study, researcher used following tools:

3.3.1 VARK Learning Style Inventory

Learning style of subjects was measured through VARK learning style inventory developed by VARK. There are 29 items in it each item has four options representing each style namely: visual, aural, read/write and kinesthetic. The respondents are asked to record their responses by selecting one option out of four options (1,2,3,4). The minimum score for each type is 0 and maximum score for each type is 16.
Reliability of VARK Learning Style Inventory

V 0.85  
A 0.82  
R 0.84  
K 0.77  

VARK learning style inventory is a standardized tool and it has satisfactory reliability and validity.

3.3.2 Locus of Control Scale

Locus of control of subjects was measured through ‘Internal-External Locus of Control scale’ of Rotter’s. This scale is forced choice instrument which consists of 29 pairs of statements, 23 of which are scored. There are 6 filler items (items no. 1,8,14, 19,24, and 27) which are not scored.

High scores indicates external locus of control. The maximum possible score in Rotter’s Locus of Control scale is 23 and minimum is 0.

Reliability of Hindi Version Scale

1. Split-half 0.78  
2. Test-retest 0.73  

Hindi version of Rotter’s Locus of Control scale is highly reliable by split-half and test-retest methods.

3.4 PROCEDURE

After selection of schools, investigator made a personal visit of each and every selected school. Investigator took the permission of Principal by clarifying purpose of the visit. Then investigator assured the students that the information collected from them will keep confidential and will be used only for the purpose of the research. The students were handed over the Learning Style inventory and Locus of control scale. The procedure for filling the inventory and scale was made clear to all of them. The investigator collected all the inventories and scales and thanked them for their cooperation. The investigator thanked the principal before leaving the school. The same procedure was followed in all the schools. The inventories and scale thus
collected were scored as the prescribed procedure and the data obtained were recorded for analysis and interpretation.

3.5 STATISTICAL TECHNIQUES

The statistical techniques, namely 2 x 2 x 2 ANOVA and t-test were used to find out the significance of difference, among various pairs of groups.
CHAPTER IV
ANALYSIS AND INTERPRETATION OF DATA

In accordance with the objectives of the study, the data on learning styles were collected. After collecting the relevant data with the help of suitable tools, statistical analysis was performed by applying 2x2x2 analysis of variance for testing the hypotheses. In case of significant F-ratio, post-hoc analysis was done with the help of ‘t’ test and thereafter interpretations were made of statistical obtained results.

The present chapter gives the systematic account of the analysis and interpretation of the data pertaining to learning styles in relation to gender, category and locus of control and also to know their interactional effects.

DESIGN OF STUDY

4.1 EFFECTS OF GENDER, CATEGORY AND LOCUS OF CONTROL ON THE VISUAL LEARNING STYLE OF HIGH SCHOOL STUDENTS

For identifying the differences in visual learning style of high school students 2x2x2 analysis of variance involving two levels of gender (male and female), two levels of category (SC and non-SC) and two levels of locus of control (internal and external) was applied. Table-4.1 presents the summary of means and Table-4.2 presents the summary of 2x2x2 ANOVA.

Table-4.1
MEANS AT VARIOUS LEVELS IN AXBXC FACTORIAL DESIGN ON VISUAL LEARNING STYLE

<table>
<thead>
<tr>
<th></th>
<th>A1</th>
<th>A2</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>1.7</td>
<td>2.01</td>
</tr>
<tr>
<td>C2</td>
<td>1.3</td>
<td>1.32</td>
</tr>
<tr>
<td>B2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>1.6</td>
<td>1.9</td>
</tr>
<tr>
<td>C2</td>
<td>1.4</td>
<td>1.3</td>
</tr>
</tbody>
</table>
Table 4.2
Summary of 2x2x2 ANOVA in respect of Visual Learning Style

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>Mean Score</th>
<th>F-Ratio</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (A)</td>
<td>6.19</td>
<td>1</td>
<td>6.19</td>
<td>1.67</td>
<td>NS</td>
</tr>
<tr>
<td>Category (B)</td>
<td>4.78</td>
<td>1</td>
<td>4.78</td>
<td>1.29</td>
<td>NS</td>
</tr>
<tr>
<td>Locus of Control (C)</td>
<td>5.68</td>
<td>1</td>
<td>5.68</td>
<td>0.002</td>
<td>NS</td>
</tr>
<tr>
<td>AXB</td>
<td>6.96</td>
<td>1</td>
<td>6.96</td>
<td>1.88</td>
<td>NS</td>
</tr>
<tr>
<td>AXC</td>
<td>0.96</td>
<td>1</td>
<td>0.96</td>
<td>0.26</td>
<td>NS</td>
</tr>
<tr>
<td>BXC</td>
<td>5.11</td>
<td>1</td>
<td>5.11</td>
<td>0.014</td>
<td>NS</td>
</tr>
<tr>
<td>AXBXC</td>
<td>15.96</td>
<td>1</td>
<td>15.96</td>
<td>4.32</td>
<td>*</td>
</tr>
<tr>
<td>Within Groups</td>
<td>621.32</td>
<td>168</td>
<td>3.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>656.22</td>
<td>175</td>
<td>3.75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at 0.05 level of significance for df 1/168.

Main Effects

4.1.1 Gender (A)

It is clear from Table 4.2 that F-Ratio for the main effect of gender on visual learning style came out to be 1.67 which is not significant at 0.05 level of significance for 1/168 df. On the basis of this the hypothesis stated as:

There will be no significant main effect of gender on the visual learning style of high school students was accepted.

From this it may be interpreted that male and female high school students do not differ significantly in their visual learning style preference.

4.1.2 Category (B)

It can be seen from Table 4.2 that F-ratio for the main effect of category on visual learning style came out to be 1.29 which is not significant at 0.05 level of significance for 1/168 df. Therefore, the hypothesis stated as:

There will be no significant main effect of category on the visual learning style of high school students was accepted.

From this it may be concluded that SC and non-SC high school students do not differ in their preference for visual learning style.
4.1.3 Locus of Control

It is obvious from Table 4.2 that F-ratio for the main effect of locus of control on visual learning style came out to be 0.002. It was found to be non-significant at 0.05 level of significance for 1/168 df. Therefore, the hypothesis stated as:

There will be no significant main effect of locus of control on visual learning style of high school students was accepted.

From this it may be inferred that two groups of students having internal and external locus of control are similar with regard to the use of visual learning style. In other words, locus of control had no significant link with visual learning style.

4.2 TWO FACTOR INTERACTION EFFECTS

4.2.1 AxB (Gender x Category)

It may be observed from Table 4.2 that F-ratio for double interactional effect of gender x category on visual learning style came out to be 1.88. It was found to be non-significant at 0.05 level of significance for 1/168 df. Therefore, the hypothesis stated as:

There will be no significant double interactional effect of gender x category (A x B) on visual learning style of high school students was accepted.

From this it may be interpreted that the main effect of B (category) is same for two levels of A (gender) or the main effect of A (gender) is same for two levels of B (category).

4.2.2 AxC (Gender x Locus of Control)

It can also be seen from Table 4.2 that F-ratio for double interactional effect of gender x locus of control on visual learning style came out to be 0.26. It was found to be non-significant at 0.05 level of significance for 1/168 df. On the basis of this, the hypothesis stated as:

There will be no significant double interactional effect of gender x locus (AXC) of control on the visual learning style of high school students was accepted.
4.2.3 BxC (Category x Locus of Control)

It can be seen from Table 4.2 that F-ratio for the double interactional effect of category x locus of control (B x C) on visual learning style came out to be 0.014 which is not significant at 0.05 level of significance for 1/168 df. On the basis of this, the hypothesis stated as:

There will be no significant double interactional effect of category x locus of control (B x C) on the visual learning style of high school students was accepted.

From this it may be interpreted that the main effect of C (locus of control) is same for the two levels of C (locus of control).

4.3 THREE FACTOR INTERACTION EFFECTS

A x B x C (Gender x category x locus of control)

The gender x category x locus of control (AxBxC) interaction in the Table 4.2 reveals significant F-value 4.32 for 1/168 df at 0.05 level of significance.

The fact that A x B x C mean score is significant indicates that the nature of observed A x B interaction is different for internal and external locus of control. Further, the nature of interaction for the interactive effect of AxBxC can be examined from graph (Fig.1). In this graph we have chosen C for the X-axis. The forms of the graph in Fig. A1 and A2 are not fairly similar and this finding is consistent with the significance of the AxBxC mean square.
Figure 4.1

Showing Interaction of Gender X Category X Locus of Control

(A X B X C) on Visual Learning Style

MEAN SCORES ON VISUAL LEARNING STYLE

C1 (EXTERNAL LOCUS OF CONTROL)

C2 (INTERNAL LOCUS OF CONTROL)
4.4 EFFECTS OF GENDER, CATEGORY AND LOCUS OF CONTROL ON AURAL LEARNING STYLE OF HIGH SCHOOL STUDENTS

For identifying the differences in aural learning style of high school students, 2 x 2 x2 analysis of variance involving two levels of gender (male and female), two levels of category (SC and non-SC) and two levels of locus of control (internal and external) was applied. Table 4.3 presents the summary means and Table-4.4 presents the summary of 2 x 2 x2 ANOVA.

**Table-4.3**
Means at Various Levels In AxBxC Factorial Design on Aural Learning Style

<table>
<thead>
<tr>
<th></th>
<th>A1</th>
<th>A2</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>C1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.68</td>
</tr>
<tr>
<td></td>
<td>C2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.99</td>
</tr>
<tr>
<td>B2</td>
<td>C1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.24</td>
</tr>
<tr>
<td></td>
<td>C2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.88</td>
</tr>
</tbody>
</table>

**Table-4.4**
Summary of 2x2x2 ANOVA in respect of Aural Learning Style

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>Mean Score</th>
<th>F-Ratio</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (A)</td>
<td>43.01</td>
<td>1</td>
<td>43.01</td>
<td>9.97</td>
<td>**</td>
</tr>
<tr>
<td>Category (B)</td>
<td>0.006</td>
<td>1</td>
<td>0.006</td>
<td>0.001</td>
<td>NS</td>
</tr>
<tr>
<td>Locus of Control (C)</td>
<td>25.51</td>
<td>1</td>
<td>25.51</td>
<td>5.91</td>
<td>*</td>
</tr>
<tr>
<td>A x B</td>
<td>18.46</td>
<td>1</td>
<td>18.46</td>
<td>4.28</td>
<td>*</td>
</tr>
<tr>
<td>A x C</td>
<td>0.689</td>
<td>1</td>
<td>0.689</td>
<td>0.159</td>
<td>NS</td>
</tr>
<tr>
<td>B x C</td>
<td>7.78</td>
<td>1</td>
<td>7.78</td>
<td>1.80</td>
<td>NS</td>
</tr>
<tr>
<td>A x B x C</td>
<td>3.55</td>
<td>1</td>
<td>3.35</td>
<td>0.823</td>
<td>NS</td>
</tr>
<tr>
<td>Within Groups</td>
<td>724.86</td>
<td>175</td>
<td>4.31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>823.86</td>
<td>175</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at 0.05 level of significance for df 1/168
**Significant at 0.01 level of significance for df 1/168
Main Effects:

4.4.1 Gender (A)

It is clear from Table 4.4 that F-ratio for the main effect of gender on aural learning style came out to be 9.97 which is highly significant at 0.01 level of significance for 1/168 df. Therefore, the hypothesis stated as:

There will be no significant effect of gender on the learning style of high school students was rejected.

From this it may be interpreted that significant difference existed in preference for aural learning style of male and female high school students.

4.4.2 Category (B)

It can be seen from Table 4.4 that F-ratio for the main effect of category on aural learning style of high school students came out to be 0.012 which is not significant at 0.05 level of significance for 1/168 df. Therefore, the hypothesis stated as:

There will be no significant effect of category on aural learning style of high school students was accepted.

From this it may be interpreted that SC and non-SC high school students do not differ in their preference for aural learning style.

4.4.3 Locus of Control (C)

It is clear from Table 4.4 that F-ratio for the main effect of locus of control on aural learning style came out to be 5.11 which was found to be significant significance at 0.05 level of significance for 1/168 df. On the basis of this, hypothesis stated as:

There will be no significant effect of locus of control on aural learning style of high school students was rejected.

From this it may be concluded that both groups of students having external and internal locus of control differ significantly with regard to their liking for aural learning style.

Since F-ratio tells overall results regarding differences and does not pin point the exact source of variation on mean scores of the
groups. In order to find out the exact source of difference 't' test was used. Table 4.4.1 provides the obtained results of 't' test.

**Table-4.4.1**

Summary of ‘t’ Tests on Aural Learning Style in respect of Gender and Locus of Control

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>t-Value</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>88</td>
<td>3.79</td>
<td>2.13</td>
<td>3.54</td>
<td>**</td>
</tr>
<tr>
<td>Female</td>
<td>88</td>
<td>4.96</td>
<td>2.24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locus of control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External LOC</td>
<td>88</td>
<td>4.85</td>
<td>2.23</td>
<td>2.37</td>
<td>*</td>
</tr>
<tr>
<td>Internal LOC</td>
<td>88</td>
<td>4.09</td>
<td>2.03</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Significant at 0.01 level of significance for df 174
*Significant at 0.05 level of significance for df 174

It may be observed from Table 4.4.1 that ‘t’ value on aural learning style of male and female high school students came out to be 3.54 for 174 df which is significant at 0.01 level of significance. From this it may be interpreted that male and female high school students differed significantly with regard to their preference for aural learning style. Mean score of female students (4.96) is more than the mean score of male students(3.79). From this it may be concluded that female high school students preferred learning through aural learning style more as compared to male high school students.

It can also be seen from Table 4.4.1 that ‘t’ value for high school students having internal and external locus of control came out to be 2.37 for 174 df which is significant at 0.05 level of significance. From this it may be said that there existed significant differences in mean scores of high school students having internal and external locus of control. Mean scores of students having external locus of control (4.85) is more than the mean score of students having internal locus of control (4.09). From this it may be concluded that students having external locus of control were more tended towards aural learning style than their counterparts with internal locus of control.

**4.5 TWO FACTOR INTERACTION EFFECTS**

**4.5.1 AXB (Gender X Category)**

It may be seen from Table 4.4 that F-ratio for double interactional effect of AXB (gender x category) on aural learning style
of high school students came out to be 4.28 which is significant at 0.05 level of significance for 1/168 df. Therefore, hypothesis stated as:

There will be no significant interaction effect of gender x category on aural learning style of high school students was rejected.

From this it may be interpreted that the main effect of A (Gender) is not the same for the two levels of B (Category) or the main effect of B (Category) is not the same for the levels of A (Gender).

We can also examine the nature of interaction for the interactive effect of A x B (Gender x Category) from graph (Fig. 2). In this graph we have chosen B (Category) for X-axis. From the examination of the figure it is clear that lines for A1 and A2 are not parallel. We have a significant AxB (Gender x Category) interaction mean square (18.46) is equivalent to stating that lines A1 and A2 can not said to be parallel with the limits of random variation. This means that the difference between the means of A1(male) and A2 (female) for non-SC and SC are significantly different.

**Figure 4.2**

**Showing Interaction of Gender X Category (A X B) on Aural Learning Style**

![Graph showing interaction of gender x category on aural learning style](image-url)
From this it may be concluded that male and female high school students differ significantly with regard to their aural learning style at two levels of category.

**4.5.2 A x C (Gender x Locus of Control)**

It can be seen from Table 4.4 that F-ratio for double interactional effect of A x C (Gender x Locus of Control) on aural learning style of high school students came out to be 0.063 which is not significant at 0.05 level of significance. On the basis of this, the hypothesis stated as:

There will be no significant interaction of gender x locus of control on aural learning style of high school students was accepted.

From this it may be interpreted that the main effect of C (locus of control) is same for two levels of A (Gender) or the main effect of A (gender) is same for two levels of C (locus of control).

**4.5.3 B X C (Category x Locus of Control)**

From Table 4.4 can be observed that F-ratio for double interactional effect of B x C (category x locus of control) came out to be 1.40 which is non-significant at 0.05 level of significance for 1/168 df. Therefore, the hypothesis stated as:

There will be no significant interaction of category x locus of control on aural learning style of high school students was accepted.

From this it may be concluded that the main effect of C (locus of control) is same for two levels of B (category) or the main effect of B (category) is same for two levels of C (locus of control) on aural learning style of high school students.

**4.6 THREE FACTOR INTERACTION EFFECTS**

**A X B X C (Gender X Category X Locus of Control)**

It can be observed from Table 4.4 that F-ratio for triple interactional effect of A x B x C (gender x category x locus of control) on aural learning style came out to be 0.57 which is not significant at 0.05 level of significance for 1/168 df. On the basis of this, the hypothesis stated as:
There will be no significant interaction effect of gender x category x locus of control on aural learning style of high school students was accepted.

From this it may be interpreted that the nature of A x B (gender x category) is same for internal and external locus of control.

4.7 EFFECTS OF GENDER, CATEGORY AND LOCUS OF CONTROL ON READ/WRITE LEARNING STYLE OF HIGH SCHOOL STUDENTS

For identifying the differences in read/write learning style of high school students 2x2x2 analysis of variance involving two levels of gender (male and female), two levels of category (SC and non-SC) and two levels of locus of control (internal and external locus of control) was applied. Table 4.5 presents the summary of means and Table- 4.6 presents the summary of 2x2x2 ANOVA.

**Table-4.5**
Means at Various Levels in AxBxC Factorial Design on Read/Write Learning Style

<table>
<thead>
<tr>
<th></th>
<th>A1</th>
<th>A2</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>C1</td>
<td>1.18</td>
</tr>
<tr>
<td></td>
<td>C2</td>
<td>1.15</td>
</tr>
<tr>
<td>B2</td>
<td>C1</td>
<td>1.17</td>
</tr>
<tr>
<td></td>
<td>C2</td>
<td>1.19</td>
</tr>
</tbody>
</table>

**Table-4.6**
Summary of 2x2x2 ANOVA in respect of Read/Write Learning Style

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>Mean Score</th>
<th>S.D.</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (A)</td>
<td>22.55</td>
<td>1</td>
<td>22.55</td>
<td>7.81</td>
<td>*</td>
</tr>
<tr>
<td>Category (B)</td>
<td>0.278</td>
<td>1</td>
<td>0.278</td>
<td>0.096</td>
<td>NS</td>
</tr>
<tr>
<td>Locus of Control (C)</td>
<td>1.28</td>
<td>1</td>
<td>1.28</td>
<td>0.443</td>
<td>NS</td>
</tr>
<tr>
<td>A X B</td>
<td>6.19</td>
<td>1</td>
<td>6.19</td>
<td>2.14</td>
<td>NS</td>
</tr>
<tr>
<td>A X C</td>
<td>0.46</td>
<td>1</td>
<td>0.46</td>
<td>0.159</td>
<td>NS</td>
</tr>
<tr>
<td>B X C</td>
<td>5.68</td>
<td>1</td>
<td>5.68</td>
<td>0.002</td>
<td>NS</td>
</tr>
<tr>
<td>A X B X C</td>
<td>5.46</td>
<td>1</td>
<td>5.46</td>
<td>1.89</td>
<td>NS</td>
</tr>
<tr>
<td>Within Groups</td>
<td>485.14</td>
<td>168</td>
<td>2.89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>521.36</td>
<td>175</td>
<td>2.98</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at 0.01 level of significance for df 1/168
Main Effects:

4.7.1 Gender (A)

It can be seen from Table 4.6 that F-ratio for the main effect of gender on read/write learning style came out to be 7.81 which is significant at 0.01 level of significance for 1/168 df. Therefore, the hypothesis stated as:

There will be no significant effect of gender on read/write learning style of high school students was rejected.

From this it may be interpreted that significant differences existed in preference for read/write learning style of male and female high school students.

In order to find out the exact source of difference 't’ test was used. Table 4.3.1 provides the obtained results of t-test.

Table 4.6.1

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>t-value</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Male</td>
<td>88</td>
<td>4.74</td>
<td>1.51</td>
<td>2.80</td>
<td>*</td>
</tr>
<tr>
<td>2.</td>
<td>Female</td>
<td>88</td>
<td>5.45</td>
<td>1.86</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at 0.01 level of significance for 174 df

It is clear from Table 4.6.1 that t-value on read/write learning style came out to be 2.80 which is significant at 0.01 level of significance for 174 df. From Table 4.3.1 the mean for male students is equal to 4.74 and the mean for girls is equal to 5.45. The fact that the A mean score is (22.55) is significant leads us to conclude that these two means differ significantly. In other words, regardless of the levels of category and locus of control, female high school students have significantly higher mean score in terms of their preference for read/write learning style as compared to the male high school students.
4.7.2 Category (B)

It can be seen from Table 4.6 that F-ratio for the main effect of B (category) on read/write learning style came out to be 0.096, which is non-significant at 0.05 level of significance. Therefore, the hypothesis stated as:

There will be no significant effect of category on read/write learning style of high school students was accepted.

From this it may be said that regardless of the levels of gender and locus of control the SC and non-SC high school students have similar preference for read/write learning style.

4.7.3 Locus of Control (C)

Similarly for the main effect of C (locus of control) in the Table 4.6 the computed F-value is 0.443 for 1/168 df which is not significant even at 0.05 level of significance. On the basis of this, the hypothesis stated as:

There will be no significant effect of locus of control on read/write learning style of high school students was accepted.

From this it may be concluded that irrespective of the levels of gender and category students having external and internal locus of control have similar interest in read/write learning style.

4.8 TWO FACTOR INTERACTION EFFECTS

4.8.1 A x B (Gender x Category)

It can be observed from Table 4.6 that F-ratio for the double interactional effect of A X B (Gender x Category) on read/write learning style came out to be 2.14, which is not significant at 0.05 level of significance for 1/168 df. Therefore, the hypothesis stated as:

There will be no significant interaction effect of gender x category on read/write learning style of high school students was accepted.

From this it may be interpreted that the main effect of B (category) is same for two levels of A (Gender) or the main effect of A (Gender) is same for two levels of B (category).
4.8.2 A x C (Gender x Locus of Control)

Table 4.6 shows that F-ratio for double interactional effect of A x C (Gender x Locus of Control) on read/write learning style came out to be 0.159. It was to be non-significant at 0.05 level of significance for 1/168 df. On the basis of this, hypothesis stated as:

There will be no significant interaction of A x B (Gender x Locus of Control) on read/write learning style of high school students was accepted.

From this it may be interpreted that the main effect of C (locus of control) is same for two levels A (Gender) or the main effect of A (Gender) is same for two levels of C (Locus of Control).

4.8.3 B X C (Category x Locus of Control)

It can be seen from Table 4.6 that F-ratio for the double interactional effect of B x C (Category x Locus of Control) on read/write learning style came out to be 0.002, which is not significant at 0.05 level of significance for 1/168 df. Therefore, the hypothesis stated as:

There will be no significant interaction effect of B x C (Category x Locus of Control) on read/write learning style of high students was accepted.

From this it may be interpreted that the main effect of B (Category) is same for two levels of C (Locus of Control) or the main effect of C (Locus of Control) is same for two levels of B (Category) is same for two levels of B (Category).

4.9 THREE FACTOR INTERACTION EFFECTS

A X B X C (GENDER X CATEGORY X LOCUS OF CONTROL)

It can be observed from Table 4.6 that F-ratio for the triple interactional effect of A x B x C (Gender x Category x Locus of Control) on read/write learning style came out to be 1.89 which is not significant at 0.05 level of significance for 1/168 df. Therefore, the hypothesis stated as:
There will be no significant interaction effect of gender x category x locus of control on read/write learning style of high school students was accepted.

From this it may be interpreted that the nature of A x B (Gender x Category) interaction is same for internal and external locus of control on read/write learning style.

**4.10 EFFECTS OF GENDER, CATEGORY AND LOCUS OF CONTROL ON KINESTHETIC LEARNING STYLE OF HIGH SCHOOL STUDENTS**

For identifying the differences in kinesthetic learning style of high school students 2x2x2 analysis of variance involving two levels of gender (male and female), two levels of Category (SC and non-SC) and two levels of locus of control (internal and external) was applied. Table 4.7 presents the summary of means and Table 4.8 presents the summary of 2x2x2 ANOVA.

**Table-4.7**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>Mean Score</th>
<th>F-ratio</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (A)</td>
<td>8.20</td>
<td>1</td>
<td>8.20</td>
<td>1.23</td>
<td>NS</td>
</tr>
<tr>
<td>Category (B)</td>
<td>4.45</td>
<td>1</td>
<td>4.45</td>
<td>0.67</td>
<td>NS</td>
</tr>
<tr>
<td>Locus of Control (C)</td>
<td>27.84</td>
<td>1</td>
<td>27.84</td>
<td>4.16</td>
<td>*</td>
</tr>
<tr>
<td>A X B</td>
<td>16.57</td>
<td>1</td>
<td>16.57</td>
<td>2.48</td>
<td>NS</td>
</tr>
<tr>
<td>A X C</td>
<td>4.45</td>
<td>1</td>
<td>4.45</td>
<td>0.67</td>
<td>NS</td>
</tr>
<tr>
<td>B X C</td>
<td>2.75</td>
<td>1</td>
<td>2.75</td>
<td>0.411</td>
<td>NS</td>
</tr>
<tr>
<td>A X B X C</td>
<td>15.36</td>
<td>1</td>
<td>15.36</td>
<td>2.23</td>
<td>NS</td>
</tr>
<tr>
<td>Within Groups</td>
<td>1122.91</td>
<td>168</td>
<td>6.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1202.54</td>
<td>175</td>
<td>6.87</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significance at 0.05 level of significance for df 1/168
Main Effects

4.10.1 Gender (A)

Table 4.8 shows that the F-ratio for the main effect of gender A (Gender) on kinesthetic learning style came out to be 1.23 which is not significant even at 0.05 level of significance for 1/168 df. Therefore, the hypothesis stated as:

There will be significant effect of gender on kinesthetic learning style of high school students was accepted.

From this it may be interpreted that male and female high school students do not differ in their preference for kinesthetic learning style.

4.10.2 Category (B)

It can be seen from Table 4.8 that F-ratio for the main effect of category on kinesthetic learning style of high school students came out to be 0.67 which is not significant even at 0.05 level of significance for 1/168 df. On the basis of this, the hypothesis stated as:

There will be no significant effect of category on kinesthetic learning style of high school students was accepted.

From this it may be interpreted that SC and non-SC high school students do not differ in their preference for kinesthetic learning style of high school students.

4.10.3 Locus of Control (C)

It is clear from Table 4.8 that F-ratio for main effect of locus of control on kinesthetic learning style came out to be 4.16 which is significant at 0.05 level of significance for 1/168 df. Therefore, the hypothesis stated as:

There will be no significant effect of locus of control on kinesthetic learning style of high school students was rejected.

From this it may be interpreted that significant differences existed in preference for kinesthetic learning style of high school students.
From this it may be interpreted that significant difference existed in preference for kinesthetic learning style of high school students having internal and external locus of control.

In order to find out the exact source of difference t-test was used. Table 4.8.1 provides the obtained results of t-test.

**Table- 4.8.1**

**Summary of ‘t’ test for Kinesthetic Learning Style in respect of Locus of Control**

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>S.D.</th>
<th>t-Value</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>External LOC</td>
<td>88</td>
<td>7.49</td>
<td>2.38</td>
<td>2.11</td>
<td>*</td>
</tr>
<tr>
<td>Internal LOC</td>
<td>88</td>
<td>6.69</td>
<td>2.777</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at 0.05 level of significance for 174 df

It may be observed from Table 4.8.1 that t-value for kinesthetic learning style of students having external and internal locus of control came out to be 2.11 for 174 df which is significant at 0.05 level of significance. Mean score of students having external locus of control (7.49) is more than the mean score of students having internal locus of control. From this it may be concluded that students having external locus of control preferred learning through kinesthetic learning style more than the students having internal locus of control.

**4.11 TWO FACTOR INTERACTION EFFECTS**

**4.11.1 A X B (Gender x Category)**

It may be observed from Table 4.8 that F-ratio for double interactional effect of A X B (Gender x Category) came out to be 2.48 which is not significant at 0.05 level of significance for 1/168 df. On the basis of this, the hypothesis stated as:

There will be no significant interaction effect of A x B (gender x category) on the kinesthetic learning style of high school students was accepted.

From this it may be interpreted that the main effect of B (category) is same for two levels of A (gender) or the main effect of A (gender) is same for the two levels of B (category).
4.11.2 A x C (Gender x Locus of Control)

It can be seen from Table 4.8 that F-ratio for the double interactional effect of A x C (gender x category) on kinesthetic learning style came out to be 0.67 which is not significant at 0.05 level of significance for 1/168 df. Therefore, the hypothesis stated as:

There will be no significant interaction effect of A x C (gender x locus of control) on kinesthetic learning style of high school students was accepted.

From this it may be interpreted that the main effect of C (locus of control) is same for two levels of A (gender) or the main effect of A (gender) is same for two levels of C (locus of control).

4.11.3 B x C (Category x Locus of Control)

From Table 4.8 it is clear that F-ratio for double interactional effect of category x locus of control on kinesthetic learning style came out to be 0.411 which is not significant at 0.05 level of significance for 1/168 df. On the basis of this, the hypothesis stated as:

There will be no significant interaction effect of B X C (category x locus of control) on kinesthetic learning style of high school students was accepted.

From this it may be interpreted that the main effect of C (locus of control) is same for two levels of B (category) or the main effect of B (category) is same for two levels of C (locus of control).

4.12 THREE FACTOR INTERACTION EFFECTS

A X B XC (Gender x Category x Locus of Control)

It can be seen from Table 4.8 that F-value for triple interactional effect of A x B x C (Gender x Category x Locus of Control) on kinesthetic learning style came out to be 2.29 which is not significant even at 0.05 level of significance for 1/168 df. Therefore, the hypothesis stated as:

There will be no significant interaction effect of A X B XC (gender x category x locus of control) on kinesthetic learning style of high school students was accepted.
From this it may be interpreted that the nature of A X B (gender x category) interaction is same for external and internal locus of control on kinesthetic learning style.
CHAPTER V
SUMMARY, CONCLUSIONS, EDUCATIONAL
IMPLICATIONS AND SUGGESTIONS FOR FURTHER
RESEARCH

The ultimate goal of any research is to arrive at a final solution of the problem or an answer to the research question with which the investigation was conducted. Such a solution is in the nature of being ‘conclusion’ of the study. After analysis and interpretation of the data and discussion of the results, logical conclusions were drawn, implications of education were stated and suggestions for further research were offered. This chapter gives the detail account of these aspects.

5.1 SUMMARY

Learning occupies a very important place in human life. It is a lifelong process. Learning is said to be equivalent to change, modification, development, improvement and adjustment. It is not confined to school learning, cycling, reading, writing or typing but it is comprehensive term which leaves a permanent effect or impression on the individuals. Man is a rational animal. He has got the power of reasoning. This power enables him to learn things quickly. Learning plays a very important role in determining behaviour of an individual. It is the basis of success in life. The miracles of present day civilization are the result of learning. Learning occupies very important role in the field of education. We want to educate the students and it is only learning which is education.

Active learning occurs when the pupil has some responsibility for the development of the activity. Supporters of this approach recognize that a sense of ownership and personal involvement is the key to successful learning. Active learning can be defined as purposeful interaction with ideas, concepts and can involve reading, writing, listening, talking or working with tools, equipment and
material such as paint, wood, chemicals etc. In a simple sense, it is learning by doing.

5.1.1 Learning Styles

Psychologist argue that a cognitive or learning style is considered to be fairly fixed characteristic of an individual, which may be distinguished from learning strategies, which are the ways learners cope with the situations and tasks.

5.1.2 Types of Learning Styles

There are different types of learning styles some of them are as follows:

Visual (V):

This preference includes the depiction of information in maps, spider diagrams, charts, graphs, flow charts, labelled diagrams, all the symbolic arrows, circles, hierarchies and other devices that people use to represent what could have been presented in words, it does not include still pictures or photographs of reality, movies, videos or power point. It does include designs, patterns, shapes and the different that are used to highlight and convey information. When a whiteboard is used to draw a diagram with meaningful symbols for the relationship between different things that will be helpful for those with a visual preference.

Aural (A):

This perceptual mode describes a preference for information that is ‘heard or spoken’. Learners who have this as their main preference, report that they learn best from lectures, group discussion, radio etc. The aural preference includes talking out loud as well as talking to oneself. Often people with this preference want to sort out things by speaking first, rather than sorting out their ideas and then speaking. They may say again what has already been said, or ask an obvious and previously answered question. They need to say it themselves and they learn through saying it – their way.
**Read/Write (R):**

This preference is for information displayed as words. Many students and teachers have a strong preference for this mode. This preference emphasizes text-based input-output, reading and writing in all its forms but especially manuals, reports, essays and assignments. People who prefer this modality are often addicted to power-point, the internet, lists, diaries, dictionaries, quotations and words.

**Kinesthetic (K):**

By definition, this modality refers to the ‘perceptual preference related to the use of experience and practice (simulated or real)’. Although such an experience may invoke other modalities, the key is that people who prefer this mode are connected to reality, ‘either through concrete personal experiences, examples, practice or simulation’. It includes demonstrations, simulations, videos and movies of ‘real’ things, as well as case studies, practice and applications. The key is the reality or concrete nature of the example. If it can be grasped, held, tasted, or felt, it will probably be included. People with this as a strong preference learn from the experience of doing something and they value their own background of experiences and less, so the experiences of other. It is possible to write or speak kinesthetically if the topic is strong based in reality. An assignment that requires the detail of who will do what and when, is suited to those with preference, as is a case study or a working example.

**5.1.3 Locus of Control**

Locus of control was defined in terms of personal control a person has over the reinforcements and the reward that follow actions and efforts. When a particular event was perceived by an individual as contingent upon his own relatively stable characteristics, this was referred as ‘Internal’ locus of control. On the other hand, when the event was perceived by him as a consequence of some action of his own but not being entirely contingent upon it or is attributed luck, chance, fate or under control by others, such a belief is termed as “external” locus of control.
5.1.4 Statement of the Problem

In view of the above discussion, the problem of the study is stated as under:

A STUDY OF LEARNING STYLES OF HIGH SCHOOL STUDENTS IN RELATION TO THEIR GENDER CATEGORY AND LOCUS OF CONTROL.

5.1.5 Objectives

Following were the objectives realized in the present study:

1. To study the main effects of gender, category and locus of control on the visual learning style of high school students.

2. To study the double interactional effects of gender x category, gender x locus of control and category x locus of control on the visual learning style of high school students.

3. To study the triple interactional effects of gender x category x locus of control on the visual learning style of high school students.

4. To study the main effects of gender, category and locus of control on the aural learning style of high school students.

5. To study the double interactional effects of gender x category, gender x locus of control and category x locus of control on the aural learning style of high school students.

6. To study the triple interactional effects of gender x category x locus of control on the aural learning style of high school students.

7. To study the main effects of gender, category and locus of control on the read/write learning style of high school students.

8. To study the double interactional effects of gender x category, gender x locus of control and category x locus of control on the read/write learning style of high school students.

9. To study the triple interactional effects of gender x category x locus of control on the read/write learning style of high school students.
10. To study the main effects of gender, category and locus of control on the kinesthetic learning style of high school students.
11. To study the double interactional effects of gender x category, gender x locus of control and category x locus of control on the kinesthetic learning style of high school students.
12. To study the triple interactional effects of gender x category x locus of control on the kinesthetic learning style of high school students.

5.1.6 Hypotheses

The following hypotheses were formulated for the present study which were subsequently tested:

1. There will be no significant main effects of gender, category and locus of control on the visual learning style of high school students.
2. There will be no significant double interactional effects of gender x category, gender x locus of control and category x locus of control on the visual learning style of high school students.
3. There will be no significant triple interactional effects of gender x category x locus of control on the visual learning style of high school students.
4. There will be no significant main effects of gender, category and locus of control on the aural learning style of high school students.
5. There will be no significant double interactional effects of gender x category, gender x locus of control and category x locus of control on the aural learning style of high school students.
6. There will be no significant triple interactional effects of gender x category x locus of control on the aural learning style of high school students.
7. There will be no significant main effects of gender, category and locus of control on the read/write learning style of high school students.
8. There will be no significant double interactional effects of gender x category, gender x locus of control and category x locus of control on the read/write learning style of high school students.

9. There will be no significant triple interactional effects of gender x category x locus of control on the read/write learning style of high school students.

10. There will be significant main effects of gender, category and locus of control on the kinesthetic learning style of high school students.

11. There will be no significant double interactional effects of gender x category, gender x locus of control and category x locus of control on the kinesthetic learning style of high school students.

12. There will be no significant triple interactional effects of gender x category x locus of control on the kinesthetic learning style of high school students.

5.1.7 Operational Definition of the Key Terms

**Learning style:**

Learning style refer to four learning styles: visual, Aural, Read/write

Kinesthetic: as measured by VARK learning style Inventory.

**Gender:**

Gender refer to male and female students.

**Category:**

Category refers to SC and non-SC students.

**Locus of Control:**

Locus of control refers to External and Internal locus of control as measured by Rotter’s locus of control scale.

5.1.8 Delimitations of the Study

The present study was delimited in tem of the following ways

1. The study was restricted to the learning style with reference to gender, category and locus of control.

2. The study was restricted to the investigation of learning style of 9th class students.
3. The study was delimited to the Districts Bilaspur and Shimla of Himachal Pradesh.

4. The study was delimited to the students of government schools only.

5.1.9 Research Method

Methodology has to be the most important aspect towards any study. By method we mean systematic approach towards a particular phenomena. Methodology used in any investigation, in fact, determines its testing. For the conduct of the present study, Descriptive survey method was used.

5.1.10 Sample

The population of the present study comprised of high school students of Himachal Pradesh. The sample was taken from 8 schools of Swarghat and Sader blocks of Bilaspur district and 9 schools of municipality area of Shimla district. Total sample of students was 340 initially. The high schools from each district were selected conveniently. The students from each school were selected randomly.

5.2 CONCLUSIONS

On the basis of analysis and interpretation of the data conclusions were drawn. These have been presented below systematically:

5.2.1 Effects of Gender, Category and Locus of Control on the Visual Learning Style of High School Students

i) Male and female high school students have same preference for visual learning style.

ii) SC and non-SC high school students do not differ significantly in their preference for visual learning style.

iii) High school students having internal and external locus of control do not differ in their preference for visual learning style.

iv) Gender and category variables, together, are not related to the visual learning style of high school students. Gender- category interaction do not play an important role in determining the visual learning style of high school students.
v) Gender and locus of control variables, together, are not related to the visual learning style of high school students. Gender and locus of control interaction also do not play an important role in determining the visual learning style of high school students.

vi) Category and locus of control variables, together, are not related to the visual learning style of high school students. Category and locus of control interaction do not play an important role in determining the visual learning style of high school students.

vii) Gender, category and locus of control variables are related to visual learning style of high school students, but not independently of each other. The gender and category variables interact significantly with locus of control variable in their relationship with visual learning style of high school students.

Gender, category and locus of control together play an important role in determining the visual learning style of high school students.

5.2.2 Effects of Gender, Category and Locus of Control on Aural Learning Style of High School Students

i) Female high school students preferred learning through aural learning style more than the male high school students.

ii) SC and non-SC high school students do not differ in their preference for aural learning style.

iii) Students having external locus of control were more tended towards aural learning style than the students with internal locus of control.

iv) Gender variable significantly interact with category variable in their relationship with visual learning style. Gender and category interaction plays an effective role in determining the visual learning style of high school students.

v) Gender and locus of control, together, are not related to the visual learning style of high school students. Gender and locus of control interaction does not play an effective role in determining the visual learning style of high school students.
vi) Category and locus of control, together, are not related to the visual learning style of high school students. Category and locus of control interaction does not play an effective role in determining the aural learning style of high school students.

vii) Gender and category variables do not interact significantly with locus of control on aural learning style of high school students. Gender, category and locus of control together do not play an effective role in determining the aural learning style of high school students.

5.2.3 Effects of Gender, Category and Locus of Control on Read/Write Learning Style of High School Students

i) Female high school students have more preference for read/write learning style than male high school students.

ii) SC and non-SC high school students have similar preference for read/write learning style.

iii) Students having internal and external locus of control have similar interest in read/write learning style.

iv) Gender, and category, together, is not related to the read/write learning style of high school students. Gender and category interaction does not play an important role in determining the read/write learning style of high school students.

v) Gender and locus of control, together, are not related to the read/write learning style of high school students. Gender and locus of control interaction also does not play an important role in determining the read/write learning style of high school students.

vi) Gender and category variables do not interact significantly with locus of control variable on read/write learning style of high school students. Gender, category and locus of control variables, together do not play an important role in determining the learning style of high school students.
5.2.4 Effects of Gender, Category and Locus of Control on the Kinesthetic Learning Style of High School Students

i) Male and female high school students have same preference for kinesthetic learning style.

ii) SC and non-SC high school students do not differ significantly in their preference for kinesthetic learning style.

iii) Students having external locus of control prefer learning through kinesthetic learning style more than the students having internal locus of control.

iv) Gender and category variables, together, are not related to the kinesthetic learning style of high school students. Gender and category interaction also not play an important role in determining the kinesthetic learning style of high school students.

vi) Category and Locus of control variables, together, are not related to the kinesthetic learning style of high school students. Category and locus of control interaction do not play an important role in determining the kinesthetic learning style of high school students.

vii) Gender and category variables do not interact significantly with locus of control variable on kinesthetic learning style of high school students. Gender, category and locus of control variables, together do not play an important role in determining the learning style of high school students.

5.3 EDUCATIONAL IMPLICATIONS

I On the basis of the conclusions of the present study it was found that the female high school students are significantly more interested in learning through aural and read/write learning style. In order to improve girls achievement at high school level, the use of radio, television, internet etc. should be encouraged. Arrangements for group discussions, lectures by eminent persons and teachers, enough books in library, writing
and quiz competitions should be encouraged in the school. Girl students should be provided enough opportunities to learn according to their interests at school level.

II Students having external locus of control have more interest in learning through aural and kinesthetic learning style. External factor should be made internal as possible. Teaching should be done with using teaching aids teaching aids, demonstrations and providing first-hand experience to the students. Field-trips and picnics at historical and educationally important places should be encouraged.

III The prospective teachers should be given proper training so that they can understand different learning styles of the students.

IV The students with differential learning styles should be identified and differentiated into different groups on the basis of respective learning styles. Teaching strategies should be prepared by the teachers in accordance with the learning style preferences of the students.

V The administrators should establish the system in their institutions which suits to maximize the learning of the students.

5.4 SUGGESTIONS FOR FURTHER RESEARCH

I The present study was conducted on a sample of high school students only. Similar studies may also be conducted at other levels.

II In the present study only three variables, namely, gender, category and locus of control were studied. Studies may also be conducted on other cognitive and non-cognitive variables in relation to their interests.

III The present study was restricted to the high school students of Bilaspur and Shimla districts only. Similar studies may also be conducted on other districts of Himachal Pradesh.
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