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“For many years, visionaries and futurists have been telling us that one day we would have quick and easy online access to all of the world’s information. Well, the future has arrived; [it’s] called the World Wide Web (www) and its growth in the past few years has been phenomenal. Already the web is showing us how global networks will transform education”, asserts Kearsley (1996).

Education is a natural, amicable and progressive advancement of man’s connate powers. It is a mode through which the society disseminates its heritage of past experiences and transformations, system of values and the techniques or skills of transmitting it. It provides children, youth and adult with the ability to respond, make selections and lead a better life. It is an important constituent of economic and social growth and development.

Due to the existence of an ample social diversification in India, it is arduous to transform the social grounding of students, parents and their economic background. Therefore, the only choice left for us is to impart compatible or standardized teaching learning resources or methods. For improving the quality of education throughout India, there should be some common network, which administers equivalent quality education to all learners, including the individuals from the remote areas and suburbs. The answer to all the questions is Web Based Instruction.

The usage of both information and communication technology (ICT) have an abundant capability to enhance teaching and learning process. Presently, computer is considered as a super teaching machine. Computer based instructional system integrates viewing, learning and doing and hence, making learning much efficient. Nowadays, software packages are more user-friendly and educating. Learners can now learn at their own speed without regard of the level at which they are presumed to be. However, these computer programs are particularly useful in teaching those subjects with which learners usually have problem.

The evolution of Internet has really brought revolution in the education process. Integrated usage of technology in educational institutions has received an extraordinary consideration in the last decade in the advanced nations. The Internet
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has now become the epicenter of attention specifically with regard to its importance as an instructional tool and has become topmost priority for educators and policy makers. The Web Based Technology (WBT) is seen as more ideally useful than other instructional technologies in learner-centered teaching.

Due to the fact that Internet is regarded as the sea of information, it is much better to disclose (introduce) this sea to all individuals as soon as possible in their lives. This can be done by employing or applying information technology & related techniques in school education or by using world wide web as an education delivery mechanism. The www is employed not only to provide knowledge but it also imparts ample possibility to augment learning beyond the boundary of space and time. The web based teaching/learning has the capability to fulfill the perceived needs of flexible pace, place and face. The web helps education to reach the individual rather than the individual to the education.

1.1 WEB BASED INSTRUCTION

The teaching and learning process has been increasingly transformed by the aggregation of an array of technological, instructional, and pedagogical advancements in current times. Information technology is defying the structures of the educational system that have conventionally expedited and promoted learning. Current advancements and particularly in the sphere of computer have facilitated the development and implementation of novel and innovative teaching techniques.

1.1.1 History of World Wide Web (WWW)

The most significant transformation that has occurred in the world during last few years is the frequent development and transmitting of information technology in every sphere. It is acknowledged by all the fields that information technology imbibe values in materialistic and moral regions, and that is greatly applicable in areas of education, business, medicine, agronomy, social life, and entertainment.

In December 1990, after a decade of preliminary work at the European Particle Physics Laboratory in Geneva, Switzerland, Tim Berners-Lee and his colleagues designed the first version of the world wide web. It was uploaded on the Internet at large in the summer of 1991. Since the development of the world wide web (www), and the following development of the web browser in 1993, by Marc
Andresen, the web has changed the way in which we interact, and retrieve information (Chalmers, & Comer, 2000).

One of the earliest web based instructional system was WEST (Web Educational Support Tool) designed at University College, Dublin in 1995. It further developed into the high-end commercial product “Top Class” system that is still sold. Before the year 2000, WBI was not much popular, because the limitation of bandwidth and technology made it tough to provide multimedia over the Internet. Nowadays, it is not true. WBI can do almost anything. Developments in educational environment have given learners a great collection of teaching / learning choices that have dispensed the teaching learning process beyond the conventional classroom.

### 1.1.2 Internet and Education

Information technology, particularly the internet is providing abundant possibilities in various spheres and education is one of them. The web is emerging as a virtual library through which knowledge about anything is provided at practically meagre or no expenses.

The popularity of the Internet is a providing newer opportunities to widen the possibilities of organizing teaching outside the classroom. According to a 2001 report from the American Council on Education, the web has a variety of implications for education and learners.

- **Exploration**: Students can use the Web as an exploratory tool to find information and resources.
- **Experience**: The Web offers wide-ranging learning experiences, from synchronous learning to threaded discussions and self-paced study.
- **Engagement**: The Web captivates learners by enabling creative approaches to learning that foster collaboration and sense of community.
- **Ease of Use**: It is easy to use for both learners and learning providers. Content is platform independent.
- **Empowerment**: Tools can be provided for personalization of content and that allow learners to choose the way they learn best.
- **Effectiveness**: A growing body of evidence shows that distributed learning can be more effective than the classroom lecture.


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The Web’s universality and capability to impart media-rich instruction, without regard of geographical area and time, has created a revolution in the modes by which teachers teach and learners learn (Brahler, Peterson, & Johnson, 1999). The transformation from conventional face-to-face teaching to web based instruction has brought a shift in educational paradigms from teacher-led instruction to learner-controlled learning (Horton, 2000).

1.1.3 Meaning of Web Based Instruction

Web based instruction means to provide a learning environment that is intermediated and facilitated via the Internet/Intranet and linked to a computer with hyperlinks to resources which are beyond the instructional domain. The instruction is developed so that the computer provides lessons in reply to student or user interactions.

Web based instruction (WBI) refers to instruction that can be provided anytime in any part of the world to anyone having an Internet connection. This has developed into something with indefinite opportunities, and constitutes a world of enhancing skills, improvement of learning and comprehending, and modifying the attitude and behavior in a course of time.

The instruction can be as easy as using the system as a “page turner” for information, to as difficult as an integrated system which receives student inputs and replies, provides interaction with videos, animations, images, forms, examinations, or software. Not only can learning take place through interaction with the “materials” but through a community of individuals by using chatting, threaded discussions, e-mail, whiteboard, or other programs.

One perspective of web based instruction is the incidental learning that generally occurs. In a conventional “face-to-face” instruction environment, learning is termed as to be intentional—there is generally very little incidental learning. Computers and the web have transformed this model of instruction, they permit students to receive, retrieve, and store information at any place or any time.

The internet has become a powerful, universal, interactive, and dynamic interface for providing knowledge. The internet gives an opportunity to design newer learning experiences for learners not possible earlier (Alexander, 1995). As a result,
individuals from all over the world can have an equal accessibility to the various learning resources available on the web.

Web based instruction (WBI), also sometimes called web based training, is defined by Clark (1996) as, “An individualized instruction delivered over public or private computer networks and displayed by a web browser. Web based training is not downloaded computer based instruction, but rather on-demand training stored in a server and accessed across a network. It can be updated very rapidly and access to training is controlled by the training provider.”

According to WBT Information Centre (1997), “web based instruction (WBI) is an innovative approach to distance learning in which computer based training is transformed by the technologies and methodologies of the world wide web (www), the internet and intranets. WBI presents content in a structure format that allows self-directed, self-paced instruction on any topic. WBI is media rich learning fully capable of evaluation, adaptation and remediation, all independent of computer platform”.

Khan (1997) defined web based instruction as “a hypermedia-based instructional program which utilizes the attributes and resources of the world wide web to create a meaningful learning environment where learning is fostered and supported”.

Relan and Gillani (1997) referred to web based instruction as, “the application of a repertoire of cognitively oriented instructional strategies within a constructivist and collaborative learning environment utilizing the attributes and resources of the world wide web”.

In the words of Barron (1998), “Web based instruction is defined as the delivery of instruction via the world wide web. Such instruction may be delivered as a stand-alone course that does not include any face-to-face interaction between teacher and student or may be a supplement to traditional classroom instruction”.

Kurtus (1998) defined web based training as, “In its strictest sense, web based training is the communication of information over the www or web with the objective of instructing or training the user. The training is actually in the form of computer based training (CBT) that uses the web or company intranet as the delivery medium instead of using disks or CD-ROMS”. 

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According to the Oregon Network for Education (2006), “Web based instruction is a form of computer based instruction using the world wide web as the delivery method of information”. Web based instruction is considered as a means to provide a number of possibilities for education to redesign itself (Alessi & Trollip, 2001).

Although, above definitions are not similar, there is one identical aspect, which is that web based instruction makes use of the internet and world wide web to disseminate knowledge. Web based instruction, which is an evolving area in education, is undoubtedly, a part of the frequent development that is the internet. The internet, and the applications that uses it such as e-mail and www, delivers an efficient mode of transmission of information amongst people and organizations. The causes for the growth of web based instruction involve: (a) Contributes to the growth of distance education (reliable and cheapest source) in comparison to computer based learning, live broadcasting, video lectures, and so on. (b) Facilitates individuals who tend to or are forced to study outside conventional classroom to attend classes at their home or workplaces. (c) Imparts delivery mechanism, material provider and subject material in one package, contrary to other mediums, such as computer assisted instruction, which needs a separate delivery method.

Web based instruction is dynamic in nature and, therefore, facilitates the distribution and updating of knowledge almost instantaneously (Rosenberg, 2001). The capability of the web to make learning possible without regard of geographical location or time of day has made WBI a very effective tool of teaching learning for schools and colleges around the world (Williams, 2008).

1.1.4 Modes of Web Based Instruction

Web based instruction refers to the instruction administered over Internet, especially over the world wide web via the http protocol, and examined with a browser software such as Internet Explorer, Google chrome etc. In web based instruction we have two different modes of information delivery, viz., asynchronous and synchronous mode.

❖ In asynchronous mode, the instructional module is to be downloaded from a specific website and then one can open & save it offline on the computer. In this type there is no interaction of learner with instructor.
In synchronous mode, there is synchronization between the learners and instructor on-line. The synchronous web based instruction encompasses the new evolving concept of electronic learning.

The www provides teachers at educational institutions with a better choice for delivering student-centered instruction to both the learners studying in conventional classroom based instruction and the students who prefer to study through distance mode (Brahler, et. al., 1999).

1.1.5 Nature of Web Based Instruction

Web based instruction is computer enabled instruction that employs internet technology (TCP/IP, HTTP, browsers) and is imparted over computer network.

Web based instruction is a good tool for imparting instruction to students at any place in the world at any time. Development of computer networking technologies and improvement in bandwidth has brought about possibilities for indefinite multimedia accessibility. Web browsers that support 3-D virtual reality, animations, interaction, chatting and conferences, and real-time audio/video provide unmatched learning opportunities. Web based instruction can be:

- self-directed and self-paced
- individual or group instruction
- asynchronous or synchronous
- interactive
- media rich

Web Based Instruction may include: (a) text, graphics, and animation (b) streaming videos and audio files (c) database connectivity (d) interactivity (e) discussion forum, emails or chatting. WBI can employ simulation, tutorial, games, slideshows, and other activities for helping in illustrating and reinforcing the concepts and instructional material.

In web based instruction, the instructional material is kept at one source location. It can be updated regularly, and all users can view the updated version simultaneously. Once the material is updated, there would be no older versions lying around on computer to confuse students. It seems to be an ideal solution to the problem of teaching a large number of students. Web based instruction imparts
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students the opportunity to study the content that is administered over web browser. These websites vary from the sites that simply give information because their intended outcome is to teach.

1.1.6 Types of Web Based Instruction

Web based instruction is not a single entity—there are four main types of Web based instruction. Each type is beneficial under varying situations, and mostly an combinations of various types of WBI along with printed material, classroom instruction, referred websites, and other forms of knowledge delivery.

1. Leader-Led or Facilitated Online Instruction

In this form of web based instruction, there is a teacher on the back-end to give guidance and support. This type is much common at the university level, as there is a good scope for interpreting essays or open-ended questions by the teacher. It needs less time for developing instruction since there is a much reliance on the competence and knowledge of the teacher.

2. Self-Paced Web Based Instruction

There is no teacher for this form of instruction, but well designed self-paced instruction is structured around formal lessons, specifically small-sized for easier understanding (somewhat 10-30 minutes in length). The lessons include instructional objectives, reinforcement, learning activities, feedback, and assessment.

3. Online tutorials

They are simply just online documents developed to be read online or printed. Online tutorials are particularly in PDF format. They are quicker to construct and to develop, as they are generally based on existing instructional materials. They can be easily administered online or through email.

4. Web Based Electronic Performance Support System (EPSS)

An EPSS was developed as an online instruction for the fulfillment of a short task (say, 5 min). It often incorporates visual simulations “showing” rather than “saying”. It replaces other types of instruction for simpler tasks that are neither difficult nor frequently performed.

In WBI, instruction can be administered by a combination of static techniques (learning portal, hyperlinks, tutorials, audio/video lessons, and live Web broadcasting)
1.1.7 Advantages of Web Based Instruction

Web based instruction (WBI) and training is growing at a tremendous rate. Technological developments and individual demands have necessitated a transformation from a “brick and mortar” classroom to a “click and learn” classroom. The student’s role is transforming from a “recipient” to “participant”.

In Web based instruction, greater learner control and self-dependence maximizes learning and makes it more efficient. In a well constructed web based instruction learners are found to be more successful than they would be in a classroom environment. The advantages of web based instruction include:

- easy, cost-efficient administering of instruction to individuals.
- possibilities for cooperative learning (asynchronous and synchronous) as well as individualized learning.
- multi-platform capability (Windows, Macintosh, LINUX, PDA, other operating systems).
- easy update of instructional material.
- accessibility is controlled.
- installation on personal network for security or increased bandwidth.
- multi-tasking capabilities.
- increasing levels of acceptance.
- easily adapted, evaluated and modified.
- multi-media based and can capture the learner’s attention better and longer than other instructional methods.
- anyone, anywhere can have an access to the instruction.

Web based instruction encompasses the integrated design and delivery of instructional resources via the world wide web and promotes student engagement with text-based, hypermedia, multimedia, and collaborative resources for the purposes of teaching and learning. It is necessary that attention be paid to the quality of the instruction being imparted without regard for the technique used to deliver it.
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In web based instruction, due to immediate access to large resources of data and information, individuals are no longer fully reliant on teachers for knowledge. Web based learning environment allows a complete range of interactive techniques. The learner is able to discover the content matter in the range and depth one wants to study that is suitable to one’s learning ability.

Educationists opine that web based instruction is the ultimate solution to meet the requirements of students because it is offered on demand, does not need travelling, and is cost-effective. Critics point out that web based instruction is a better substitute for self-dependent and motivated learners.

1.2 LEARNING STYLES

Learning is attaining new or modifying existing knowledge, behavior, skill, value, or preference and may constitute synthesis of different kinds of information. The capability to learn is acquired by human beings. Learning may take place as part of education, personal development, schooling or training. It may be objective-oriented and may be assisted by motivating the individuals.

The view that individuals learn variably is eminent and perhaps had its roots with the earlier Greeks. Educators have, for many years, identified that some individuals have a preference for some methods of learning more than other. These dispositions, termed as learning style, constitute a learner’s distinctive learning preferences and help instructors in the designing of small-group and individualized instruction.

Styles, as a psychological variable in human performance, have captivated the attention of many researchers and psychologists. In the study of styles, various labels with the root word style have been developed. The three most often used words are cognitive style, learning style, and thinking style. Although the three kinds of styles are conceptually dissimilar (Sternberg & Zhang, 2001), they are alike in one significant manner. That is, they are all different from ability. Ability refers to what individuals can do, whereas a style refers to how individuals prefer to make use of their abilities.

Learning is exhibited in the manner we react to ecological, societal, emotional and physical stimulus, to comprehend new information. Learning style is defined as the way in which processing of information takes place. It focuses on strong points,
not limitations. There is no correct or incorrect learning style. Most learners demonstrate a liking for any specific learning style.

Individuals prefer to receive and process information in varied manner, by viewing and listening, reacting and doing, thinking logically and instinctively, analyzing and visualizing constantly and in fits and starts. The term learning style refers to the concept that students vary with regard to which method of instruction is most efficient for them. Advocates of learning styles theory assert that most advantageous teaching involves identifying individuals’ learning styles and designing the instruction in accordance to that.

1.2.1 Meaning of Learning Style

A learning style is an individual’s consistent way of reacting to and using stimulus in the context of learning. It refers to the differences in the abilities to collect as well as understand the information. Chiefly, learning style is the way that best allows congregating and using information in a particular manner.

Keefe (1979) defined learning style as the “composite of characteristic cognitive, affective, and physiological factors that serve as relatively stable indicators of how a learner perceives, interacts with, and responds to the learning environment”.

In the words of Kolb (1984), “Learning Style is a product of two choice decisions (1) How to approach at task, i.e., grasping experience (preferring to do and watch) (2) Our emotional response to the experience, i.e., transforming experience (preferring to think or feel)”.

According to Ross (1987), “Learning styles are simply different approaches of ways of learning. Some learn best with seeing, some with hearing and some with hands-on approach”.

Dunn, Beaudry & Klavas (1989) wrote, “Learning style is a biologically and developmentally imposed set of personal characteristics that makes the same teaching method effective for some students and ineffective for others”.

Stewart and Felicetti (1992) referred learning styles as “those educational conditions under which a student is most likely to learn.” Thus, learning style is not just concerned with “what” students learn, but rather “how” they tend to learn.
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Grasha (1996), asserted, “Learning style comprises of those personal qualities that influence a student’s ability to acquire information, to interact with peers and the teacher, and otherwise participate in learning experiences”.

Dunn and Dunn (2000) asserted, “Learning style is the way in which each learner begins to concentrate on, process, understand, and hold new and difficult information”. The interactions of these elements take place variedly in every individual. For that reason, it is indispensable to find out what is most likely to stimulate each learner’s attention, how to sustain it, and how to act in response to his or her natural processing style to maintain long term memory and retention.

Smith & Dalton (2005) explained, “Most simply conceived, learning style is the typical way an individual likes to go about learning. Although there are characteristics of learning styles that are quite stable in an individual across different learning tasks and contexts, there can still be variation in the same learner”.

Omrod (2008) wrote, “Some cognitive styles and dispositions do seem to influence how and what students learn. Some students seem to learn better when information is presented through words (verbal learners), whereas others seem to learn better when it’s presented through pictures (visual learners)”.

From the above definitions, it is clear that there are as many methods to teach as there are to learn. Possibly, the most imperative thing is to be conscious that individuals do not all view the world in the identical manner. They may have very dissimilar likings then for how, when, where and how often to learn. Learning style refers to various approaches or modes of learning. When differences occur between learning style of most students in a classroom and the teaching style of the teacher, the students may become uninterested and negligent in classroom, do badly in exams, get dejected about the course, the curriculum, and themselves, and in few cases switch to other courses or drop out of school.

The learning style view has attained immense popularity within the education sphere, and is often discussed at levels ranging from kindergarten to graduate level. Choosing diverse methods of learning may check the students from getting annoyed
Introduction and dissatisfied when they unable to rise up to their potentiality. Experimenting with diverse learning styles and learning environment might facilitate the learner’s accomplishment and feeling of attainment.

1.2.2 Classification of Learning Styles

There are various ways of classifying the learning styles. Here are a few of the classification systems that researchers have formulated.

1.2.2.1 The Myers–Briggs Type Indicator (MBTI). This model classifies learners in accordance to their preference on the scale derived from psychologist Carl Jung’s theory of personality types. Learners may be classified as:

1. **Extrovert** (try out things, focus on the on the outside world or individuals)
   - **Introvert** (think things through, focus on the internal world of thoughts)
2. **Sensor** (realistic, detail-oriented, focus on information and actions)
   - **Intuitor** (creative, concept-oriented, focus on definitions and alternatives)
3. **Thinker** (cynical, prefer to take decision based on reasoning and rules)
   - **Feeler** (admiring, prefer to take decision based on individual or humanistic consideration)
4. **Judger** (set and follow agenda, look for conclusion even with insufficient information)
   - **Perceiver** (adjust to varying situations, oppose conclusion to acquire more information)

The MBTI type preferences can be united to create sixteen separate learning style types. For example, one student may be an ESTJ (extrovert, sensor, thinker, and perceiver) and another may be an INFJ (introvert, intuitor, feeler, and judger).

1.2.2.2 Hermann Brain Dominance Instrument (HBDI). This model classifies learners in terms of their relative preferences for thinking in four different ways based on the functioning of the brain. The four basic modes or quadrants in this classification system are:

1. **Quadrant A (left brain, cerebral)**: rational, systematic, quantitative, data-based, and thinks critically.
2. **Quadrant B (left brain, limbic)**: chronological, ordered, planned, comprehensive, and structured;
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3. Quadrant C (right brain, limbic): affectionate, enthusiastic, sensory, kinesthetic, and figurative;
4. Quadrant D (right brain, cerebral): visual, integrated, creative.

1.2.2.3 Felder-Silverman Learning Style Model. This model classifies students as:
1. Sensing learner (concrete, realistic, facts-oriented and procedure-oriented)
   Intuitive learner (theoretical, inventive, meaning-oriented and theory-oriented)
2. Visual learner (likes visual presentation of instructional materials – images, graphs, charts)
   Verbal learner (likes printed and verbal descriptions)
3. Inductive learner (likes instruction that progress from the particular to general)
   Deductive learner (likes instruction that proceed from the general to particular)
4. Active learner (learns by doing, works with others)
   Reflective learner (learns by thinking things through, works alone)
5. Sequential learner (linear, systematic, learns in small steps)
   Global learner (holistic, thinker, learns in large steps).

1.2.2.4 David Kolb's Learning Style Model.

This model classifies learners on the basis of preferring for (1) concrete experiences or abstract conceptualization (how they take information in), and (2) active experimentation or reflective observation (how they internalize information).

1. Type 1 (concrete, reflective). A typical question of this learning style is “Why?” Type 1 learners react well to details of how subject matter is related to their experience, interest, and future career. To be successful with Type 1 learners, the teacher should work as a motivator.

2. Type 2 (abstract, reflective). A typical question of this learning style is “What?” Type 2 learners react to knowledge given in a systematic, logical manner and gain if they have time for reflecting. To be successful, the teacher should try to work as an expert.
3. **Type 3 (abstract, active).** A fundamental question of this learning style is "How?" Type 3 learners react well to the possibilities to work enthusiastically on well-defined task and to learn by trial-and-error in an atmosphere that permit them to be defeated safely. To be successful, the teacher should work as a guide, giving guided practice and advice.

4. **Type 4 (concrete, active).** A fundamental question of this learning style is "What if?" Type 4 learners prefer to apply subject matter in newer circumstances to resolve real problems. To be successful, the teacher should remain out of the way, optimizing possibilities for the learners to determine solutions for themselves.

### 1.2.2.5 Field-Dependent and Field-Independent Learners

Field dependent learner often perceives a pattern as a whole, not separating one component from the total image. They face problem in concentrating on one element of a situation, selecting important information, analyzing a pattern into different components, or examining their use of techniques to solve problems. They prefer to work in group, have a good memory for social information, and likes subjects such as languages and social sciences.

Field independent learners are more likely to monitor their own information processing. They recognize separate parts of a total pattern and analyze a pattern in accordance to its components. They are not as concerned for social relationships as field-dependent learners, but they perform better in mathematics and sciences, where their analytical ability is utilized.

### 1.2.2.6 Visual / Auditory / Kinesthetic Learning Styles

According to this classification, learning styles can be classified into three categories viz. Visual, Auditory, and Kinesthetic. These learning styles are discussed below:

**Visual Learning Style**

Visual learning refers to learning style in which ideas, thoughts, facts and other information are correlated with pictures and other visual aids. Visual learners have a inclination for watching. They tend to prefer to be seated at the first bench of the classroom to avoid visual distractions (e.g. student’s head). They may think in the form of images and learn best from visual presentation including pictures, graphs, text- books, LCD projectors, video clippings, charts and hand-outs.
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During classroom teaching, visual learners often like to take complete notes to understand the concepts. They have a preference for describing everything that they view in terms of images. Visual learners are generally, good writers and commonly perform reasonably well on assignments. They are able to memorize how a word looks instead of the sequence of a word.

Characteristics of Visual learners

The important characteristics of visual learners are as following:-

- When memorizing any information, prefer to visualize it
- Likes to study from video clippings, presentation, charts, graphs etc.
- Gets annoyed by visual distraction
- Likes to draw diagrams, graphs, pictures, etc. for understanding the concepts
- Benefits from preparing their own class-notes, even if the material is already printed
- Preview the book chapters by looking through titles, graphs, charts and other visual aids
- Likes to read magazine, text-books and other form of study material
- Can memorize accurately where the text is situated on a page
- Prefers a silent place to study
- Faces difficulty listening to lectures that are longer in time
- Are generally good in spellings
- Particularly tidy, neat and clean
- Focuses better when there is a clear line of sight to visual materials

Auditory Learning Style

Auditory learning is a learning style in which a learner learns through hearing. Such type of students learn better through verbal lecture, discussion, dialogues debating and hearing what others are saying. Auditory learners analyses the underlying meaning of speech by hearing the voice tone, pitch, speed and other traits. Written text might have no meaning unless it is not listened. These students generally profit from reading out the information loudly and employing an audio system.
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Auditory learners rely heavily on listening and speaking as a major means of studying. Auditory learners should be able to listen what is being spoken in order to comprehend and might have problem with instruction that is in written form. They also employ their hearing and reading skill to go through the information that is provided to them.

**Characteristics of Auditory learners**

The various characteristics of auditory learners are as following:

- When remembering a piece of information, say out loudly and then remembers, recalls it by recognizing its sound.
- Are better at writing answers to lectures which they’ve listened.
- Learns most efficiently through audio books, lectures, oral presentations and verbal instructions
- Hearing music in the background aids them to learn better
- Are good at storytelling
- Gains from reading out loudly
- Usually talkative in class
- Information often has little significance unless it is listened
- Likes debates and dialogues
- Able to remember verbal instructions better than written direction
- Enjoys to listen to the news
- Generally perform well in foreign language
- Must reiterate information such as phone number
- Likes to be a public speaker

**Kinesthetic Learning Style**

Kinesthetic learning is a learning style in which learning takes place by the learner by actually carrying out a physical activity, rather than listening to a lecture or merely watching a demonstration. Kinesthetic learners tend to learn via experience—moving, touching, and doing (active exploration of the world; science projects; experiments, etc.). They might find it difficult to sit still for longer time period and
would become diverted by their need for activity and exploration. Individuals with a kinesthetic learning style are also generally known as do-ers.

According to exponents of the learning style theory, individuals who essentially have a kinesthetic learning style are considered to be natural discovery learners. They have realizations through doing, as contrary to having thought first before commencing a task. They find it difficult to learn by reading or listening. In Kinesthetic learning style, learning takes place by the student by employing the body so as to exhibit a thought, an idea or comprehension of a specific concept. Kinesthetic learners’ short term and long term memory is empowered by the employment of their body movements.

Characteristics of Kinesthetic learners

Kinesthetic learners have the following characteristics:

- Generally performs well in things such as Physics lab activities, sports activities, art and dancing.
- Understands best by manipulating things, using tools, etc.
- Can concentrate on two varied tasks at the same time
- Tend to acquire skills through practicing and imitating of others
- Have very good eye-hand coordination and are active respondents
- Likes acting, experiencing, discovering
- Benefits from hands-on teaching techniques
- Often good at dance, martial arts
- Learns best from visits to places and field trips
- Use hands to communicate and talks fast
- Take short breaks while doing study
- Generally good at playing a music instrument
- Becomes anxious during long study periods
- Studies best when they are able to move about freely
- Often touch others in a gesture of friendship
Thus, knowledge about learning style can help teachers in becoming much sensitive to the variations learners bring to the classroom. It may also act as a guide map in developing learning experiences which match or mismatch learner's style, which depends on the teacher's objective. A few studies reveal that determining a learner's style and then imparting education in accordance to that learning style assures much more efficient learning. One of the first task, teachers can do to assist the learning process is to be practically conscious that there are varied learning styles of the students.

Sarasin (1998) found that teachers should be ready to transform their instructional strategies and methodologies based on an identification of the varied learning styles of students. Teachers should strive to assure that their teaching strategies, materials, and techniques suits the way in which the individuals learn and optimize the learning potentialities of each learner.

Knowledge about learning styles is essentially useful in student matters. During guidance, for example, style may suggest which technique of counseling to use for specific individuals. Furthermore, when individuals have difficulty in courses, it can guide counselors to put their efforts for doing intervention. In orientation, it can aid the learners to determine their own inclinations and aptitude in learning and be a motivating force for discovering newer ways of studying.

1.3 ATTITUDE

1.3.1 Meaning of Attitude

The word ‘Attitude’ is derived from the Latin word ‘APTUS’ that means adaptness or fitness. An attitude is a hypothetical variable that indicates an individual’s amount of likeness or dislike for something. Attitudes are, in general positive or negative opinions of an individual, place, thing, or event— this is frequently termed as the attitude object. Individuals can also be doubtful or ambivalent toward an object, which means that they at same time possess both favorable and unfavorable attitude towards the object in question.

An attitude is a manner, disposition, feeling, position, etc., with regard to a person or thing. It is a tendency or orientation, especially of the mind. An attitude is the manner an individual looks at something or tend to orient towards it, generally in an evaluative mode. These are cognitive representations of our evaluation of
ourselves, other people, things, actions, events, or ideas. An attitude is an individual’s perception towards a particular target and mode of saying and performing things.

An attitude is the evaluative statement or judgment concerning any object, individual, or event. More specifically, attitude can be referred to as a consistent tendency to feel and act in a specific manner towards some object which may consist of some event or an individual as well.

Thurstone (1929) believed, “Attitude is a complex of man’s inclinations, feelings, bias, ideas, fears, threats etc. Opinion is verbal expression of attitude. Some attitudes are so deeply ingrained as to appear permanent, while others are merely transitory and may change overnight”.

According to Allport (1935), “Attitude is a mental and neural state of readiness organized through experience, exerting a dynamic influence upon the individual’s response to all objects with which it is related”.

Garret (1961) stated, “An attitude is primarily an inner state rather than an overt experience”.

Sherif (1965) explained, “An attitude is a habitual way of looking at an object, a person or an idea”.

Jung (1971) defined an attitude as, “a readiness of the psyche to act or react in a certain way”.

Bohner & Wanke (2004) defined an attitude as, “a summary evaluation of an object of thought. An attitude object can be anything a person discriminate or holds in mind”. Attitude objects may be concrete (e.g. eatables) or abstract (e.g. freedom of speech), may be inanimate things (e.g. toy cars), persons or groups (e.g. politicians, etc.).

Our attitudes are based on information. Due to the reason that we can never know all the information which we have on any specific attitude object, our attitudes are generally open for reviewing. Our lives are occupied with possibilities of attitude change. Attitudes are attained through learning and can be modified through persuasion by employing varied strategies. Attitudes, once developed, help to reshape the experiences the individuals have with objects, things or people. Although attitudes modify slowly, an individual regularly develop new attitudes and change older ones when they are meet newer circumstances and experiences.
Many attitudes are the outcome of either firsthand experiences or learning by observation from the environment. Contrary to personality, attitudes are found to transform as a function of experience. Tesser (1993) has asserted that heredity variables might affect an attitude— but believed that they might do so indirectly. Attitude, generally, come in pairs. The main attitude dualities that Jung defined are the following.

- **Conscious and Unconscious:** The presence of two attitudes is extremely frequent, one conscious and the other unconscious. This implies that consciousness has a collection of components which vary from that of the unconsciousness.

- **Extroversion and Introversion:** This pair is so fundamental to Jung’s theory of types that he termed these as the “attitude-types”.

- **Rational and Irrational Attitude:** The rational attitude is further divided into the thinking and feeling psychological variables. The irrational attitude is further subdivided into the sensing and intuition psychological variables.

### 1.3.2 Characteristics of Attitude

Attitude can be characterized in three ways:

- **First,** they tend to persist unless something is done to change them.

- **Second,** attitudes can fall anywhere along a continuum from very favorable to very unfavorable.

- **Third,** attitudes are directed toward some object about which a person has feelings (sometimes called “affect”) and beliefs.

A significant aspect of an attitude is that it expresses an evaluation of some object. Evaluations are exhibited in terms of like-dislike, pro-anti, favorable-unfavorable, and positive-negative. They are the feelings aroused by any attitude object. The research into how students’ attitude affects learning has been one of the important fields of interest of researchers. Some opine that attitude has much to do with upbringing and environment. The vital role of attitude is well acknowledged in framing the curriculum of schools.
1.3.3 Persuasion and Attitude Change

Attitude can be modified through persuading and we should recognize that attitudes modify in response to communication. Experimental investigations into the reasons that affect the modification of attitude include:

1. **Target Characteristics:** These characteristics refer to the individual who accepts and processes a message. One such variable is intelligence— it is seemed that more intelligent individuals are difficult to be persuaded by one-sided messages. Another attribute that is identified in this category is self-esteem. The relation between self-esteem and persuasion is curvilinear, with individuals having moderate self-esteem being easier to be persuaded than both having higher and lower self-esteem levels.

2. **Source Characteristics:** The dominant source characteristics are expertise, faithfulness and interpersonal attraction or attractiveness. The trustworthiness of a received message is found to be an important variable here. If an individual reads a medical report and has a belief that it comes from a professional doctor, one might be easy to be persuaded than if one believes it is from a news channel.

3. **Message Characteristics:** The nature of the message plays a vital role in persuasion. Presenting both sides of a story may be helpful to modify an attitude. A message can attract an individual’s cognition so as to help him in modifying attitude.

1.3.4 Components of Attitude

An attitude is a vital part of individuality. It is termed as a total evaluation of an object of thought which can be something an individual categorizes or keeps in mind. The three basic components of attitude are cognitive, conative and affective.

- **Cognitive Component:** It indicates to an opinion or belief aspect of attitude. When one develops some opinion on the basis of given information and decides whether one has a positive or negative opinion on that, it is the cognitive aspect of attitude.
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- **Conative Component:** It states the emotional part of attitude. It is probably the most frequently discussed aspect of attitude and determines mostly the favorable or unfavorable aspects of attitude.

- **Affective Component:** It indicates the behavioral aspect of attitude. If one has a favorable attitude towards a specific object, it is transformed into a specific kind of behavior, such as acquiring or purchasing that object.

  Our attitudes rely on information. As one is never familiar with all the existing information on any specific attitude object, one’s attitude is always open for review. One’s life is packed with possibilities for attitude change.

1.3.5 Ways of Changing Attitude

Some of the typical ways of changing an attitude are discussed below.

- **Providing Newer Information:** Sometimes a sudden change in attitude is occurred by imparting significant and abundant information to an individual. Insufficient and inadequate information can be an important cause of developing negative attitude.

- **Utilizing Fear Emotion:** An attitude can be changed by employing fear. Individuals may choose to transform their attitude due to the fear of unpleasant outcomes. However, the degree to which fear is to be aroused will have to be taken into account as well.

- **Settling of Discrepancies:** Whenever individuals face some conflicting circumstance they become confused while selecting a specific course of action. For example, in the case where one is to select from between two different course of action, it generally becomes hard for him to choose which is correct for him. If somebody assists him in determining the positive points in favor of any one course of action, the individual may solve his confusion.

- **Influence of Friends and Peers:** A very efficient method of modifying one’s attitude is considering the opinion of friends and peer group. Their opinions and recommendations for something often prove to be much significant.
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- **Co-opting**: If one wants to change an attitude of someone who belongs to the other group, it is generally very helpful to incorporate him in one’s own group.

1.3.6 Barriers in the Way of Changing Attitude

- **Prior Commitment**: When individuals feel a commitment towards a specific course of action that have already been agreed upon and thus it becomes hard for them to accept or modify the newer methods of functioning.

- **Incomplete Information**: It also acts as a main barrier in changing an attitude. At times, individuals do not find any reason to transform their attitude due to lack of sufficient information.

Attitudes may include affective, behavioral and cognitive responses. Some attitudes may be fundamental to an individual’s self-concept, and by exhibiting or stimulating this attitude an individual asserts his or her basic values. With this in mind, **Prentice and Carlsmith (2000)** have linked attitudes to other valuable possessions of an individual.

1.3.7 Attitude Towards Physics

Physics is derived from Greek word “physis” which implies “nature”. Physics is a natural science related to the study of matter and its motion through space, time and all that derives from these, such as energy and force. In broader sense, it is the extensive study of nature which is done in order to know how the world and universe behave.

Physics is one of the oldest academic disciplines, or probably the oldest through its inclusion of astronomy. Over the last two millennia, Physics had been considered synonymous with philosophy, chemistry, and certain branches of mathematics and biology, but during the scientific revolution in the 16th century, it developed into a distinctive modern science in its own right. However, in some subject areas such as in mathematical Physics and quantum Physics, the boundaries of Physics remain difficult to be distinguished from other disciplines.

Physics- the study of matter, energy and their interactions- is an international endeavor, which plays an important role in the future development of humanity. The
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support of research & development in Physics subject in all the nations of the world is significant due to the reason that:

1. Physics is an extraordinary intellectual endeavor that motivates young students and broadens the horizons of our knowledge about natural processes.

2. Physics provide fundamental knowledge required for the future technological developments that will continually trigger the economic development of the world.

3. Physics contribute to the technological growth and development and provides trained individuals which needed to take benefits of scientific inventions and discoveries.

4. Physics is a significant discipline in the education of scientists, doctors and computer engineers, as well as professionals from other physical and medical science fields.

5. Physics broadens and facilitates our knowledge of other subject areas, such as geology, agriculture, chemistry, biology, and environmental sciences, plus astroPhysics and cosmology- subjects of considerable significance for all individuals of the world.

6. Physics enhances our standard of life by imparting the fundamental knowledge essential for developing new instruments and techniques for medical applications, such as computer tomography, magnetic resonance imaging, positron emission tomography, ultrasonic imaging, and laser surgery.

Physics is everywhere around us. It is present in the microscopic world of atoms and in the large universe. There is Physics in our day-to-day life. From the instant we wake up, to the moment we asleep, our actions include Physics. When we prepare our food, clean our clothes, wash the utensils, view the television, or respond to a phone call, we apply the principles of Physics.

The clamorous human urge of information and understanding of the nature gives birth to scientific principles. From these principles, new technology is discovered that, further, provides more precise, extended and new experimental
observations to prove or disprove theories. Thus, there is a great alliance between
discoveries in Physics and novel technologies.

There is Physics in revolving objects, moving vehicles and trains, flying kites
and airplanes, accelerating jet planes, and revolving satellites. Physics is applicable in
the development of roads, bridges, houses, buildings, boats, and ships. Understanding
the theories of Physics help us to understand, value, and communicate better with our
environmental surroundings.

The happening of lightning and thunderstorms or occurrence of a rainbow in
the sky can be described by the theories and principles of Physics. We can explain
why rainfall occurs, why there is day and night, and why there are high tides and low
tides. Physics helps in making our life more luxurious and pleasant. The
contemporary comforts in our homes such as refrigerator, washing machine, and floor
cleaner has made our task easier. Latest modes of transport, means of communication,
and developments in medicine, agriculture, and engineering fields have occurred due
to the applications of the principles of Physics.

The year 2005 has been announced as the ‘World Year of Physics’ to
distinguish Physics as a basis of not only sciences, but also our society. This
recognition is correlated with the 100th anniversary of Albert Einstein’s “miraculous
year” of 1905, during which he published papers on the theories of relativity, quantum
mechanics and Brownian motion, theories that have intensively influenced all of
modern Physics.

Only science, with Physics as its foundation, can answer a number of the
difficult questions which are being faced by our society, such as global warming,
deforestation, exhausting energy and other non-renewable resources, and the polluting
of our planet. Kofi Annan, the former UN Secretary General has rightly said that the
prevailing tragedies throughout the contemporary world are directly linked to ongoing
diseases, poverty, and the ruining of our environment. He also said that the inadequate
access to Physics and other sciences as well as technology has contributed too many
of these troubles. Unfortunately, the researchers’ community wastes much of their
time finding solutions to the problems of the developed world only.
Physics provides testing, thrilling, and prolific career. As a career, Physics cover many specific fields—from astronomy, space research, and astrophysics to quantum physics, electrodynamics, and natural sciences. Physics discloses doorways to employment opportunities throughout the world in medicine, industries, colleges, universities, and private institutions.

In general, the ‘Attitude towards Physics’ is, in a way, feeling about Physics. Attitude towards Physics denotes interests or feelings towards studying Physics. It is the students’ disposition towards ‘like’ or ‘dislike’ of Physics. Students’ beliefs and attitudes have the potential to either facilitate or inhibit learning.

Attitudes, whether favorable or unfavorable, influence learning of physical sciences, mathematics or other subjects. However, it is a well known fact that unfavorable attitudes toward a particular subject make learning or future-learning impossible. Hence, developing a positive attitude towards science/physics lessons is the most significant objective of teaching science to the students.

A great deal of research has been conducted in past few years relating to attitude towards Physics and the correlation between the attitude and achievement. Various causes have been brought into focus as important contributors to the unfavorable attitude that learners acquire towards studying Physics. These causes are linked to school and classroom, the individual and even extrinsic factors related to the incentives and rewards that various nations confer onto physics-based careers (Woolnough, 1994).

Koballa (1988) pointed out that attitude can be modified, but such occurrences are not spontaneous, something must happen to cause the change. Learners do not like or dislike Physics in school, they learn to like it or dislike it.

Attitude, like academic achievement, is a significant consequence of what is taught in schools. The inculcation of learners’ favorable attitude towards Physics as a subject is one of the main responsibilities of every Physics instructor. Unfortunately, researches have shown that much of what goes on in a Physics classroom is not at all appealing to the individuals across all ages.
1.4 ACHIEVEMENT

1.4.1 Meaning of Achievement

Achievement refers to anything which is accomplished successfully, particularly by means of putting one’s efforts, skills, practicing, or through dedication. Achievement is generally determined through examination or continuous evaluation but there is no general agreement on how it is best tested or which aspects are most significant — procedural knowledge such as skills or declarative knowledge such as facts.

Achievement can be referred to as superiority in all academic subjects, in classroom as well as co-curricular activities. It involves distinction in sports, behavior, confidence level, communication skill, punctuality, determination, and the like.

Achievement in an educational institution may be taken to mean any desirable learning that is observed in the student. Learning is not limited to mere acquisition of information but it includes attitudes, interests, values etc. Therefore, the acquisition of desirable characteristics is as much an achievement as is knowledge of the principles of science or facts, world, history or language and literature.

In the broad sense of educational growth, the term achievement refers to the acquisition of all the changes associated with cognitive, affective and psychomotor domains. But in the context of school situation, it refers to the achievement made by pupils in their subjects of study. It is the proficiency of performance in a given skill or body of knowledge. It can also be visualized as degree of the individual’s learning and his capability to apply what he has learnt.

Achievement is examined by the extent to which skills or knowledge has been obtained by an individual from the training provided to him. It is the consequence of general and specific learning experiences.

In the words of Crow and Crow (1956), “Achievement means the extent to which the learner is profiting an instruction in a given area of learning”.

Travers and Robert (1964) termed achievement to be any desirable learning that occurs. It is obvious that whether a particular learning is referred to as an
achievement or not, depends upon whether somebody considers it desirable or not. Hence, any behavior that is learned may be described as achievement.

Biswas and Aggarwal (1971) referred to achievement as, “the knowledge attained or skill developed in the academic subjects usually designated by test scores”. In other words, it refers to the degree or level of success or proficiency attained in some special area concerning school or academic work”.

Sullivan (2001) remarked, “Achievement is the level of learning in a particular area of subject in terms of knowledge, understanding, skills and application, usually designated by test scores or marks assigned by the teacher or both”.

Precisely measuring student’s achievement is a significant part of formulating plan for a student’s education. However, not a single instrument should be employed to measure the achievement. A learner may exhibit knowledge on one instrument and not on another. Employing good techniques to examine student’s achievement from numerous sources will make sure good information and the best possible educational planning.

Achievement can also be visualized as status on level of a person’s learning and his ability to apply what he has learnt (Pressy, Robinson and Hurlock, 1967). This definition conveys only a narrow meaning of the term achievement which is, however, a much broader approach which includes attitudes, interests and values as aspects of achievement. An achievement is considered to be the product of learning, attitudes and interest because they are learned, acquired, retained and forgotten just as knowledge and skills. Thus, achievement means a person’s level of skill or range and breadth of information and what he has accomplished in a designated area of learning as behavior.

Theoretically, achievement has two aspects, viz., absolute & relative. In absolute terms, the marks or grades earned by a pupil as assigned to him by teachers on the basis of his written or oral test performance in a particular situation are taken as measure of his absolute achievement. A relative measure, however, is only a myth. When a learner’s written or verbal response or answer to a question is judged in terms
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of marks, the teacher is consciously or unconsciously comparing the response to some other response.

1.4.2 Achievement in Physics

There are frequent developments taking place in industry, engineering, agriculture, and medicine. Science as an important tool of development plays a vital role in bringing about these developments by enhancing technological advancements, increasing national wealth, facilitating health and education. Physics is the fundamental science. This implies that other sciences rely upon the information gathered through the study of Physics. Physics is, therefore, a significant subject in science and technology as it studies the essence of natural phenomena and helps individuals comprehend the increasingly technologically transforming society (Zhaoyao, 2002).

The study of Physics includes the search for truth, hence it develops intellectual honesty, diligence, dedication and observation in the students (Das, 1985). Physics therefore enables the students to attain problem-solving and decision-making skills that develop skills of thinking and inquiring which assists them to react to the diverse and constant changes in industrial sector, medicine, global climate changes, information and communication technology and socio-economic development. The teaching of Physics promotes in the students, understanding skill and scientific knowledge required for scientific researches, nurturing technological and economic development of the society, where they live thus enhancing their standard of life.

Physics is a significant science subject that fulfills vast academic demands of individuals studying in the schools. The learning of Physics is not easy at best and almost impossible at worst. But because of its considerable significance to science and technology, there is reasonably great interest in achievement in Physics. In view of this, the strategies to ensure students’ achievement in Physics have resulted into huge deal of discussions for a long time.

Achievement in Physics refers to the level of learning of Physics concepts in terms of knowledge, understanding, skills and application objectives. Learning of
different subjects may not yield similar results as there are many factors that affects student’s achievement. Teaching of Physics is facing dilemma for teachers as well as students. Physics lessons should inculcate creative thinking and critical analysis in students.

Poor achievement in Physics can be associated with many causes among which teacher’s methodology itself is considered as a significant cause. This means that the mastery level of the concepts may not be completely attained without the usage of an efficient instructional method. Physics teaching without efficient instructional method might surely result in poor academic achievement.

Use of technology has brought a lot of advantages almost in every field from science to industry, from medicine to education. Particularly, the emergence and popularity of information technology and applications for multipurpose aims gives its users not only rapidity and economic benefits but also audio and visual opportunities. Computer revolution, which began with abacus and has now reached dual core processor, has opened new doors to understanding Physics.

These technological innovations and products accompanied with them have forced conventional education system to be transformed and bring new one to meet the needs of students. It is possible to follow and keep up with the time for raising the quality of education system. As we know, modern time is driven by technology; it is essential to append technological developments into it and to utilize technology. Teaching methodologies are among those strategies which make learning more beneficial, permanent and enjoyable.

Computers and information technology being used as both tool and method of instruction are beneficial for learners in order to increase their attentiveness towards the curriculum, understanding of concepts, synthesizing and enhancing positive emotions for the subject. Choosing latest instructional methodologies make the understanding clear and more permanent by making the abstract concepts concrete. So, particularly for teaching Physics concepts like in the senior secondary classes, it is very essential to use computer based instructional methods for learners so that they learn better and develop a favorable attitude towards the subject.
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Experimental researches have shown that traditional method of teaching does not always work well. Presenting visual content makes instruction effective and successful when principles of how students learn are taken into consideration. The best learning is learning by seeing and learning by oneself.

Therefore, we will have to develop Physics lessons in such a way which captures individuals’ attention and in this way facilitates permanent learning. We must promote learning of Physics by employing computer based instructional methods to accelerate understanding of Physics concepts.

1.5 OPERATIONAL DEFINITIONS OF THE TERMS

1. **Web Based Instruction:** It is the communication of information over the www or web with the objective of instructing or training the user. In the present study it refers to the instructional technology as used by the investigator in the form of website developed for teaching the students.

2. **Learning Styles:** Learning styles are different approaches of learning. Some learn best with seeing, some with hearing and some with hands-on approach. It refers to the learning style as measured by the tool developed by the investigator.

3. **Attitude Towards Physics:** It denotes interests or feelings towards studying Physics. It is the students’ disposition towards ‘like’ or ‘dislike’ of Physics. The student may possess positive or negative attitude towards the subject. Here in this study it implies the attitude as measured by the tool developed by the investigator.

4. **Achievement:** Achievement refers to the attainment of the knowledge which student acquires during the course of his study. In the present study achievement means students’ scores on the achievement test developed by the investigator.