CHAPTER 1

INTRODUCTION
Education is the only means through which a society adjusts with its needs. Therefore, a society can never exist without education. Through education, the members of a society learn the skills to enrich, transmit and transform cultural heritage as well as existing social and scientific knowledge for the continuous advancement of the society. Teaching learning process has been inseparable from human beings since ancient times. Leaders of human thoughts have endorsed memorable words about education, knowledge and learning. An educational system is explicitly based on the quest, what to teach and how to teach.” What to teach” means the learning material. The continuing of learning material swings from linguistic to scientific knowledge. The choice of contents and subjects from the multifarious branches of knowledge is subjected to social needs.

The world would have been enveloped in the intellectual darkness if the light of education had not illuminated it. Thus, education is considered as the third eye of human beings. In this context, it has been every rightly said that he is not a man but a human who is physically fit, mentally sound, intellectually sharp, emotionally balanced and socially well adjusted. It is only education, which can help in this regard.

Education has been considered as an important input to the national development and must contribute to increase in productivity of individuals in all sectors of economy. It is a basic tool for the development and reconstruction of human beings. Investment in education ultimately promotes development of the country.

Education is one of the principal means available to foster a deeper and more harmonious form of human development and thereby to reduce poverty, exclusion, ignorance, oppression and war. The futuristic society, dominated by globalisation, also means the education will have to adapt itself to considerable economic, social and cultural changes resulting in inevitable tension between
tradition and material reality, local interests and global consideration, the
unlimited expansion of knowledge and the limited capacity of human being to
assimilate it.

1.1 INSTRUCTIONAL STRATEGIES

Instructional strategies determine the approach a teacher uses to educate
students and help them achieve their learning objectives. Instructional
strategies are techniques teachers use to help students become independent,
strategic learners. These strategies become learning strategies when students
independently select the appropriate ones and use them effectively to
accomplish tasks or meet goals.

An instructional strategy is a method in teaching (in the classroom,
online, or in some other medium) to help activate students' curiosity about a
class topic, to engage the students in learning, to probe critical thinking skills,
to keep them on task, to engender sustained and useful classroom interaction,
and, in general, to enable and enhance their learning of course content. The
goal is to enable learning, to motivate the learners, to engage them in learning,
to help them focus.

Instructional strategies can:

• Motivate students and help them focus attention.
• Organize information for understanding and remembering.
• Monitor and assess learning.

To become successful strategic learners students need:

• Step-by-Step strategy instruction.
• A variety of instructional approaches and learning materials.
• Appropriate support that includes modeling, guided practice and independent
  practice.
• Opportunities to transfer skills and ideas from one situation to another.
• Meaningful connections between skills and ideas, and real-life situations.
• Opportunities to be independent and show what they know.
• Encouragement to self-monitor and self-correct.
• Tools for reflecting on and assessing own learning.
The instructional strategies teachers use help shape learning environments and represent professional conceptions of learning and of the learner. Some strategies consider students empty vessels to be filled under the firm direction of the teacher; other strategies regard them as active participants learning through inquiry and problem solving still others tell children they are social organisms learning through dialogue and interaction with others.

An Instructional Strategy means the organization of suitable instructional components with functions specified in relation to the specific goals to be achieved. These components in any system appear in the final form of the instructional strategy in an integrated fashion. It has four phases:

1. To identify specific objectives.
2. To develop suitable learning material for the objectives.
3. To validate the workability of the strategy, and
4. To integrate different components to form the instructional strategy.

Davies (1971) describes the concept of managing teaching learning as instructional procedure which involves four steps- (1) Planning, (2) Organizing (3) Leading and (4) Controlling. In these steps the main emphasis has been given on objectives, strategies of teaching and evaluation techniques.

Reigeluth (1983) prescribes that three most important concerns of instruction strategies are outcomes, conditions and methods.

- The outcomes are the effects of the methods of instruction, their effectiveness, efficiency and appeal.
- The conditions influence the effects of the methods and therefore influence the selection of methods. They include the nature of the content, the learners, the learning environment, and the constraints of the development process.

According to Husen and Postlethwaite (1990) instructional strategies are subsets of methods of instruction. Strategies are more global and encompassing. Teacher's concern about the selection of instructional strategies will influence the effectiveness, efficacy and appeal of instruction.
The purpose of instructional strategies is to clarify the doubts of the students, if they are not able to follow or understand the concept through self-study and provide them opportunity to express their own views related to the contents of previous learning activities. Instructional Strategies further helps the students to develop better understanding and application of the concept of different topics. In the present study, the investigator employed two instructional strategies.

![Instructional Strategies](#)

1. **MODULAR INSTRUCTIONAL STRATEGY**

   Modular Instructional Strategy means Self-Learning Modules. A Self-Learning Module is a self-contained unit, designed for a specific purpose, which includes a set of activities intended to facilitate learner's achievement. It is a self-instructional unit, self-paced, employing different types of media and is a part of more comprehensive instructional system.

   Modular approach is an attempt to make the instruction individualized so that the student learn at his own pace according to his interest, capabilities and capacities (UNESCO Handbook, 1978). Modular approach appears to be an effective and economical way of developing specific knowledge and skills with minimum of teachers’ direction and supervision.

   A module is self-contained, self-pacing and self learning by nature, but a teacher has a positive role to play in its use. A module contains three coordinate basic elements of instruction a) objectives b) learning activities and c) evaluation. It is in these characters that the modules differ from other instructional materials, which either do not have all the three elements i.e. Objectives, learning activities and evaluation or if they do have, then the elements themselves are not co-ordinate.
The philosophy behind instructional modules is based on the generally accepted fact that each learner is unique and is different from others in background experience, inherent qualities, habits and learning styles and as such should be allowed to grow and develop to the fullest potential.

The modules can be prepared in different forms. They can be in written form or in the form of slides, tapes, pictures etc. One of the unique characteristics of the modules is that they can be subdivided into smaller module units to meet the needs of each individual student or group of students. In other words they can be designed for individual or group study or both.

Since a module often consists of self-contained modular units, its components can be used singly or in combination with others in accordance with the varied needs and interests of the students. One of the important characteristics of a module is that they are meant for self study and self-evaluation by a student or a group of students.

Module is usually taken to mean a single unit, complete in itself. In Modules the learning activities would normally be self-instructional in nature. The emphasis generally is on the leaner’s participation to the maximum and teacher’s participation to the minimum. Different researchers have defined a module in their own way. Some of the important definitions are given below:

Mukhopadhyay (1980) defined that an instructional module is a small 'booklet' on any subject which arranged the instructional activities in a particular sequence with adequate instructional activities for the individual learner to progress with respect to the pre-determined objectives. It is individualized as well as group-paced.

Gabriel (1981) stated that a module is a teaching-learning strategy of a system with a set of definite objectives to meet the divergent learning styles and individual differences by personalized instruction using multi-sensory approach and built-in evaluation schemes.

Husen and Postlethwaite (1985) in the International Encyclopedia of Education stated module as a self-contained and independent unit of instruction with the primary focus on a few well-defined objectives.
The substance of a module consists of materials and instructions needed to accomplish these objectives. The boundaries of a module are definable only in terms of stated objectives.

According to Warwick (1987) the term "module" is taken to mean single unit, complete in itself, but which may be added to further units towards the achievement of a larger task or a more long term goal.

Dewal (1997) while explaining the relevance of self-learning modules in a collaborative project undertaken by NCTE and Commonwealth of Learning Vocabulary emphasized that teacher is a crucial input for quality education and professional input provided to teacher will have tangible impact on teachers' activities, which, in turn, would contribute to students' improved performance. Self-learning modules will update a teacher's professional competencies, in an effort towards empowerment of the teacher.

Self Instructional Modules are developed and designed in such manner that the modules undertake the functions of a teacher. The material contained in the module will interact with student, evaluate and monitor progress of students and provide them feedback comments. Each module undertakes some of the activities that a teacher is expected to take up in a classroom, viz.

- Informing students about the instructional objectives;
- Securing and gaining students' attention;
- Stimulating recall of pre-requisite concepts;
- Inviting participation
- Eliciting performance
- Providing feedback
- Enhancing retention by frequent repetitions.

Sharma (2001) believes that the instructional module is a unit of learning, which includes a set of activities intended to facilitate the learner achievement of specific objectives. It is a relatively self-contained unit, designed for a specific purpose and is a part of a broader, more comprehensive instructional system. For him, following are the components of a module:

- the rationale
- the objectives
- the pre-assessment test
- the enabling activities
- the post assessment
- the feedback mechanism

Above-mentioned definitions highlight some of the specific characteristics, such as a specific and small self-instructional unit, self-paced, employing different types of media, having specific steps ranging from objectives to evaluation, etc. Modules can be a part of more comprehensive strategy of instruction. Different types of target groups can well use these.

Thus, Self-Learning Module is a self-contained unit, designed for a specific purpose, which includes a set of activities intended to facilitate learner's achievement. It is a self-instructional unit, self-paced, employing different types of media and is part of more comprehensive instructional system.

1.2.1 Learning from Textbooks vis-à-vis learning from Self-Learning Modules:

Self-learning modules are exclusively prepared for learners to facilitate self-learning without the help of a teacher. In the self-learning modules the functions of a teacher i.e. guiding, explaining, motivating, provoking through questions, repeating and reminding the points, monitoring the progress of studies, etc. are incorporated.

<table>
<thead>
<tr>
<th>Table:-1.1</th>
<th>Difference between Textbooks and Self-Learning Modules</th>
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</thead>
<tbody>
<tr>
<td><strong>Text Books</strong></td>
<td><strong>Self-Learning Modules</strong></td>
</tr>
<tr>
<td>* Aims at wider group of readers.</td>
<td>* Aims at specific target group.</td>
</tr>
<tr>
<td>* Focus is broad and comprehensive.</td>
<td>* Focus is on specific issue/area under discussion.</td>
</tr>
<tr>
<td>* Mainly teacher oriented.</td>
<td>* Always learner oriented and learner centred.</td>
</tr>
<tr>
<td>* Objectives of the topic are not mentioned always.</td>
<td>* Each topic has introduction and objectives.</td>
</tr>
<tr>
<td>* Most of the time learner needs the help of teacher to understand the text.</td>
<td>* To a large extent learner reads and comprehends on their own without further help from the teacher.</td>
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1.2.2 Basic Skills required in Learning from Self-Learning Modules

To ensure effective learning from the SLMs following skills are considered essential.

- Reading skills
- Study skills
- Writing skills

1.2.3 Qualities of Self-Learning Modules

- It should be self-contained. The module should be self-contained so as to enable the learner to achieve the objectives with minimum assistance from the teacher and without the need for using extraneous materials. The presentation of learning activities, pretests, formative tests, post tests, assignments, answer keys etc. should be provided in the module.
- The learning activities should make the best use of local community resources.
- The subject matter should be correct, concise and presented in an interesting manner.
- It should provide opportunities for the learner to interact with other students and the community.
- A self-learning module is so designed that it doesn't require the presence of teacher. It is capable of standing alone and acts itself as a teacher.
- Researches on instructional processes have shown that the existence of certain characteristics in instructional material greatly improves learning.

1.2.4 Important characteristics of Self-Learning Modules

Self-learning modules act as an instrument and aid for learning by performing the above mentioned tasks. The main characteristics of SLMs are explained below:

i) Self-Explanatory

Materials are presented in a logical order, conceptually clear and in self-explanatory way so that the learner can understand on their own without much support from others. Thus, the material promotes self-independent learning on the part of learner.
ii) Self-Contained

Materials presented are adequate / sufficient enough to the topic, so that learner need not go through additional material, which are not usually available to a learner in general.

iii) Self-Directed

In the absence of teacher, self-learning modules perform the role of a teacher and guide. They should instruct, modulate the teaching-learning process and direct the learner in their studies, such that the learner actively interacts with the material.

iv) Self-Motivating

Self-learning modules act as live-teacher and encourage the learners, arouse their curiosity and sustain their interest in studies through questions, problems and relating knowledge to situations. Reinforcement takes place at every stage of learning leading to better comprehension of the subject matter.

v) Self-Evaluating

Class-room teacher checks the understanding of the content and progress of learning on the part of learn & by asking questions in the class or conducting simple tests etc. and providing feedback to the students. This process of evaluation in education is built into the material itself with the help of self-assessment/check learner progress questions, activities, exercises along with the feedback in the form of mode possible answers. Self-evaluation by learner helps them to know their progress. It along with feedback provided to the learners motivates them for further learning.

vi) Self-Learning

Self-learning modules are developed on the principles of independent learning/self-learning. They provide not only subject information, but also study guidance, directions, points; illustrations, examples, case studies etc. to facilitate independent learning by learner.

vii) Informing the Learner about the Objectives

A self-learning module is based on certain predetermined objectives to be achieved by the learner after going through the module. The learner should be
informed at the very beginning of the objectives to be achieved so that he can
develop a frame of reference, which helps in acquiring new knowledge, skill
and attitude. Objectives of learning make the teaching directional.

viii) List of the Prerequisites

For acquisition of new knowledge, skills or attitude, the learner must
possess certain abilities (pre-requisites), which he requires to use while learning
new material. Therefore, in self-learning module a list of the pre-requisites
should be provided. The list of pre-requisites indicates the entry level of the
learner for the self-learning module. Often a pre-requisite test (Entry behaviour
test) is provided to ascertain suitability of a learner for the module.

ix) Gaining and Maintaining Attention of Learner

Gaining and maintaining learner's attention is important in self-learning
but is one of the most difficult jobs in instructional design. Research has shown
that the most successful method of gaining and maintaining attention of learner
is through skill of stimulus variation.

Frequent variation in instructional mode can be used for achieving this
end. Various techniques suggested by different educationists for gaining and
sustaining attention are:

• Use of diagrams, sketches, charts, photos, cartoons.
• Use of in text question.
• Use of humor.
• Introduction of variety of activities.
• Use of techniques of emphasizing, underlining, capitals or use of boxes etc.

x) Orientation and Motivation

To motivate learner, the learner should be informed of what knowledge,
skill and attitude to be learnt and how it is related to his present study and how
it will help him in his future career.

xi) Presentation of the Content in Organized Manner

In a self-learning module, new information should be presented in an
organized manner. The module should provide an organized framework
(advanced organizer) showing the learner the relationship between the new
ideas presented. Several methods for presenting the information may be adopted. Some of the important methods are:

(A) **Sequence of information in different manners like:**

- Psychological (i.e. simple to complex, concrete to abstract, general to specific)
- Chronological (first, second, third etc.)
- Spiral (presenting simple version first, and then repeating it with more complex elaboration, examples etc.)
- Logical sequencing based on reasoning methods

(B) **Inductive or deductive presentation of information**

- Inductive method where learning takes place
- Deductive method where principle is presented first and then examples.

xii) **Requiring learner to make response and provide feedback on response**

The primary aim of a self-learning module is to help the learner to process, store and retrieve the information presented in the module. Requiring the learner to practice response and then providing feedback on the response made, enhances the processing, storing and retrieval of information. A practice exercise requires the learner to apply the knowledge just acquired, which activates the learner's processing, storage and retrieval mechanism. The feedback on learner's response provides the correction of the response and, thus facilitates acquisition and retention of desired information or skill.

xiii) **Providing Self-Pacing and Redundancy**

Every individual learner differs in his/her rate of learning. Learning always improves if the; learner is allowed to proceed at his own rate. Self-pacing is automatic in self-learning module because it is under the control of the learner. Related with pacing, another important characteristic is redundancy. Sufficient redundancy is to be built in the self-learning module. If sufficient redundancy is not built in, then the learner has to repeat all or part of the module several times to achieve an objective.
Therefore, certain key concepts are to be deliberately made redundant. Some of the ways to build in redundancy in self-learning module are:

A. Providing frequent review or summaries of information covered.
B. Providing frequent practice and feedback.

Again it should be noted that using these techniques too much make the module boring. Thus, while developing a self-Learning module, the maximum number of above-mentioned characteristics should be taken care of so as to make the self-learning module an effective one.

1.2.5 Components of Self Learning Modules

The UGC Curriculum Development Committee in Education (1988) specified five very important components for a module viz. Objectives, content specification, teaching strategies, and evaluation and reading materials.

A hand book on Developing Instructional modules for Teacher’s Directions’ by UNESCO (1978) specified the components of a module as follows:

i) Introduction: The introduction gives the background and rationale of the module as well as target population for whom the module has been developed.

ii) Overview: The overview introduces the learner to the theme of the module, its purpose, structure, organization and uses. It should give an overall impression of the module and its content.

iii) Instructions to the users: This component includes clear instructions to the learners as to how this should proceed and what he has to do after each step or stage. This is an important component of the module as it would help the learner in self-learning. Most of the instructions are relating to the different components of the module such as how to take pre-test, formative test, summative test and how to undertake learning activities etc. can be given in this section. Some of the specific instructions related to evaluation and learning activities can also be given the appropriate stage.

iv) Pre Test: The pre test is taken by the learner at the beginning. This helps to find out the level of knowledge and skills that the learner already has. This helps the learner to find for himself the entry points in the module. If the
ability of the learner is up to the criterion reference or to standard fixed by the
teacher or the module developer, he is advised to skip the module and go on to
the next one. But if the level of achievement is below the expected, he is asked
to study the module.

v) Objectives: The instructional objectives of the module are clearly
stated. They should specify the expected learning outcomes in terms of
behaviours. A behavioural objective is stated clearly and precisely so that the
learner knows what the learning come out of a given activity will be.

vi) Learning Activities: Learning activity is provided in a planned and
sequenced manner. These activities enable the learners to develop behaviour in
a pre-determined direction. The following are some of the principles, which
should be kept in mind while developing the learning activities:

1. The learning activities are planned on the basis of the entry behaviour of
the learners. Entry behaviour means the previous knowledge of the learner of
the instructional objectives.

2. The learning activities are based on the needs of the learner.

3. The learning activities are based on the terminal behaviour i.e., the
ultimate outcomes of the learning activities.

4. The learning activities provide for individual differences. The activities
provide for freedom and flexibility in the learning process.

5. The learning activities are properly graded so that the learner proceeds
step by step in the order of difficulty.

6. The learning activities are of different types using different media and
methodology.

7. The methodology used in learning activities promotes imagination,
divergent thinking and creative innovative behaviour on the part of the learners.

8. The learning activities provide maximum interaction between the
learner and the module.

9. The learning activities are varied enough to cater the students’ interests,
abilities and learning styles.

10. The learning activities provide the learner with enough knowledge of
his progress.
vii) **Formative Tests:** Formative tests are given at the end of each learning unit or learning activity. The formative test helps the learner to know whether he has achieved the expected behavioural outcomes. If he has not reached the expected mastery level he goes through the learning activities again in consultation with the teacher.

viii) **Summative Evaluation:** The summative evaluation is done with the help of a post test. The post test helps in knowing how well the learner has attained the expected learning outcomes. In some modules the pre-tests and the post tests are the same but it is advisable to have two parallel versions of the same test.

1.2.6 **Developing Self Learning Modules**

At the heart of any instructional system lies the self paced instructional module. The speed of adoption of self-paced learning modules as suggested by Cross (1976) looks more revolutionary than evolutionary.

According to Govind (1975) like many of the instructional systems and strategies in current use, modules invariably include programmed instruction as a major component in them which as its essential feature of the development process, adopt some common procedures such as specification of instructional objectives in behavioural terms, analysis of task involved, field testing and revision arrangement of in-built feedback to learners and evaluation.

The following are the steps which can be used for developing a module

1. Identify the target group.
2. Identify learning needs of the group.
3. Decide terminal behaviour.
4. Identify entry behaviour.
5. Assessment of entry behaviour through pre test.
6. Teaching frames including objectives, learning activities, formative evaluation and summative evaluation.
7. Try out of the module.
8. Revision and finalisation of the module.
A Flow chart for the development of Self Learning Modules represented in figure 1.2

![Flow Chart for Development of Self Learning Modules](image)

**Flow Chart for Development of Self Learning Modules**

**Figure 1.2**

Educationists developed several modules observing the different steps. Different phases adopted by the researchers can be listed under three headings i.e., Planning stage, Drafting stage and Revising stage. UNESCO experts have also suggested three stages for the development of modules. They are:

i.) **Planning stage:**

In this the target group is identified. Where the module is to be administered is decided at this stage, i.e., in formal classroom or out of class situation. The social and physical environments, problems of daily life, work experience, development of skills, etc., of the target population are assessed in this phase.

ii.) **Drafting stage:**

Modules are drafted at this stage. Objectives of the module are formulated first. Learning experiences which are conducive in achieving these objectives are also to be selected. The modules should be formulated in such a way that students can go through the module on their own or with the minimum help of the teachers.
The first of the components suggested by UNESCO (1978) for the development of modules is as follows:

1. Introduction (Background and rationale)
2. Overview
3. Instructions to the learners
4. Objectives
5. Learning activities
6. Tests, evaluation and feedback at the pre-test stage, the formative stage and the concluding stage (summative evaluation).

iii.) Revising stage:

In this stage modifications or revision of modules is done. This revision is dealt with addition, or deletion of objectives and assessment items, sequencing, content organization and revision of language. These modules are then used in an initial try-out for further modifications. From the try-out performance the adequacy of the draft modules in terms of readability, difficulty level and content organization can be checked and necessary modifications can be attempted. The adequacy of test items can also be checked and learning activities and sequences of instructions can again be revised. Then the modules are ready for experimentation.

1.2.7 Advantages of Modular Approach

Modular strategy appears to be an effective and economical way of developing specific knowledge and skills with the minimum of teacher’s direction and supervision. Following are the advantages to the students, and teachers.

a.) Advantages to the Students:

* Students can progress at their own rate, because they have full control on their rate of study.
* Student can himself decide whether he has learnt the subject matter fully.
* The student is involved in the learning process by which his commitment to the task is enhanced.
* Modules help to develop a sense of responsibility for one’s own learning.
* Students are not forced to cover materials which are already familiar to them.
* A large pool of modules will permit students to explore portions of the subjects of particular interest without having to enroll in a full course containing topics not relevant to their needs.
* Some modules can be checked out and studied at home.
* The consequences of failure are reduced. Each student can master each module completely before proceeding to the next.

b.) Advantages to the Teachers:
* The use of modules provides an opportunity for organizing numerous sequences of experience to reflect special interests of the teacher.
* The modular approach provides a way of assessing the student’s progress in learning.
* Modules reduce the routine aspects of instruction, leaving the teacher free to engage in personal contact with the student.
* The independent nature of self instructional units facilitates the updating of study material without major revisions.
* Modules can serve as models for teachers who wish to develop their own materials using their own individuality.
* Self instructional units can be exchanged between institutions.

Therefore several self instruction modules should be developed in various subjects for effective and efficient self learning by the students.

1.3 Multimedia Instructional Strategy:

Multimedia has become a popular technology in the ever-changing world of computers. Since last few years, it seems to be much sought after the talked about, not only in the world of Information Technology, but also in various functional fields like advertisement, corporate sector, cinema, fashion design and education, to name a few. More and more research work on this new technology of sound, animation and text, is making it better and better with every passing day. It is one of the most realistic ways of working even for
people having no knowledge of computers. It targets people from almost all ages of life from a toddler to an aged one.

Multimedia is media and content that uses a combination of different content forms. This contrasts with media that use only rudimentary computer displays such as text-only or traditional forms of printed or hand-produced material. Multimedia includes a combination of text, audio, still images, animation, video, or interactivity content forms. Multimedia is usually recorded and played, displayed, or accessed by information content processing devices, such as computerized and electronic devices, but can also be part of a live performance. Multimedia devices are electronic media devices used to store and experience multimedia content. Multimedia is distinguished from mixed media in fine art; by including audio, for example, it has a broader scope. The term "rich media" is synonymous for interactive multimedia. Hypermedia can be considered one particular multimedia application.

Since the development of language only a few hundred thousand years ago, multimedia has grown in its sophistication and availability. The first recorded multimedia probably consisted of hieroglyphs and paintings on stone tablets. It was undoubtedly time-consuming to create, and comprehensible only to scribes and scholars. In the centuries that followed, multimedia was rare and accessible only to the educated upper classes.

Several inventions led to significant advancements in the development of multimedia. One was the printing press, which, after 1450, allowed large volumes of text to be readily copied and distributed. Lithography, a similar technique for printing images, was developed in 1796. Photography followed in the early nineteenth century. These inventions made text and accompanying pictures available to more of the population at less expense.

The development of the motion picture marked another important milestone at the end of the nineteenth century. The quick succession of static images created the illusion of motion with explanatory text interspersed at intervals throughout the movie. The early twentieth century saw the invention of ‘talking pictures,’ with speech and sounds synchronized to the action in the
film. This meant that literacy was no longer a barrier to understanding multimedia. Television and video permitted a similar experience to film, but at less expense and with greater flexibility. Again, words and pictures became more widely available. Digital video discs (DVDs) and interactive video discs provided higher quality sound and images, and added an element of interaction between user and multimedia.

Finally, over the past two decades, the computer has been transformed from a calculator and word processor into a multi-faceted multimedia communication device. It goes without saying that we are currently experiencing the greatest information sharing explosion in human history. Multimedia availability is increasing at an extraordinary rate with new online repositories and distributors appearing daily. The Internet is maturing, bandwidths are expanding, new software is being created, and hard drive capacities are on the rise. It has never been easier to create or distribute multimedia. Video, one of the most common multimedia formats, has become so widely available that a popular website YouTube.com regularly handles over 100 million video downloads per day.

Multimedia is being used at all levels of education, studying and improving its effectiveness is a significant and worthwhile challenge. It would be ideal if students could learn school subjects by working in groups, devising and performing experiments, and discussing their ideas with knowledgeable, experienced teachers. However, resources are limited and students must often learn by themselves with textbooks, videos, and online multimedia.

Furthermore, after leaving formal education, learners must be able to build on their knowledge with different types of learning resources. There are additional reasons for studying multimedia. Almost all learning experiences, whether interactive or not, consists of segments of linear multimedia; examining this building block can arguably provide insights into more complicated pedagogical methods.
In addition, multimedia provides a confined arena in which to test different instructional strategies with large cohorts of students in real learning environments. Novel teaching implementations in education have been criticised for varying several aspects of instruction simultaneously without attempting to understand the features essential to their success. Multimedia offers a transparent and repeatable way to study specific aspects of the teaching and learning process.


Multimedia instruction is the use of computer to present and combine text, graphics, audio and video, with links and tools that let the user navigate, interact, create and communicate. (Hofstetter1995). This definition contains four components essential to multimedia instruction.

a. First, there must be a computer to coordinate what you see and hear and to interact with.

b. Second, there must be links that connect the information

c. Third, there must be navigational tools.

d. Finally, there must be ways four you to gather process and communicate your information and ideas.

Multimedia presents subjects and materials to students in an easier to remember and more interesting may than books or a single medium can. Multimedia is able to address different learning strategies-allowing students to learn at their own pace. Research has proven that students learn better and are able to retain more when audio visual aids are added to a classroom lecture. The combination of technology and instruction has occasionally been a rocky one, but has resulted in a raised quality of education for the learner.

1.3.1 History of Multimedia

The term multimedia was coined by singer and artist Bob Goldstein (later 'Bobb Goldstein') to promote the July 1966 opening of his "Light Works at L'Oursin" show at Southampton, Long Island. Goldstein was perhaps aware of a British artist named Dick Higgins, who had two years previously discussed a new approach to art-making he called "inter media." On August 10, 1966,
Richard Albarino of Variety borrowed the terminology, reporting: “Brainchild of songscribe-comic Bob (‘Washington Square’) Goldstein, the ‘Light works’ is the latest multi-media music-cum-visuals to debut as discothèque fare.” Two years later, in 1968, the term "multimedia" was re-appropriated to describe the work of a political consultant, David Sawyer, the husband of Iris Sawyer—one of Goldstein’s producers at L’Oursin. In the intervening forty years, the word has taken on different meanings. In the late 1970s, the term referred to presentations consisting of multi-projector slide shows timed to an audio track. However, by the 1990s ‘multimedia’ took on its current meaning.

In the 1993 first edition of McGraw-Hill’s Multimedia: Making It Work, Tay Vaughan declared “Multimedia is any combination of text, graphic art, sound, animation, and video that is delivered by computer. When you allow the user – the viewer of the project – to control what and when these elements are delivered, it is interactive multimedia. When user provides a structure of linked elements through which the user can navigate, interactive multimedia becomes hypermedia.”

The German language society, Gesellschaft für deutsche Sprache, decided to recognize the word's significance and iniquitousness in the 1990s by awarding it the title of 'Word of the Year' in 1995. The institute summed up its rationale by stating "[Multimedia] has become a central word in the wonderful new media world"

In common usage, multimedia refers to an electronically delivered combination of media including video, still images, audio, text in such a way that can be accessed interactively. Much of the content on the web today falls within this definition as understood by millions. Some computers which were marketed in the 1990s were called "multimedia" computers because they incorporated a CD-ROM drive, which allowed for the delivery of several hundred megabytes of video, picture, and audio data.

Source: http://www.en.wikipedia.org
1.3.2 Multiple Facets of Multimedia

* Text: The multimedia text is the usual text with some differences as compared to the print media. Since computers can display variety of fonts in innumerable colours and combinations, multiple fonts in beautiful colours and background, feature in almost all of the multimedia presentation. The ultimate result appears much better than the printed texts. Moreover, there is a lot of added fun to hypertexts (information with linkages between the relevant topics). These are normally word processor documents that are typed into a computer. They can also be produced by scanning text from a book or elsewhere and then putting them into a word processor file. Text files have file extensions like .doc, .txt, .rtf, etc.

* Graphics: Graphics include picture, photographic images and other art works. It is this media that makes up for a visually fascinated text; hence the extensive graphics is coupled with most of the multimedia text.

* Animations: Animations are the artificial movement of text or objects, created in virtual environment using specialized software packages. Animation are perhaps the most interesting part of Multimedia but with a limitation that they are extensively time consuming and demand heavy artistic capabilities on the developer’s part. There are two dimensional and three dimensional animations. Animations are like cartoons. They are pictures or other objects that move. They could also be moving text.

* Video: In includes the actual video clips that could be embedded right over the applications and can be played back without a hitch. But the sizes of clipping are usually much smaller than those from Video Cassette Players. These days there have been rapid evolutions in PC video technology and with new concepts like MPEG and DVDs in the offing, one can witness some full motion, full screen videos. Most video production work is now done digitally. The videotape is very rapidly becoming a thing of the past. In many countries now, even the broadcast television channels transmit digital signals to TV sets, and in the near future it is likely that the old non-digital sets (called analogue receivers) will become obsolete. And we are all now familiar with DVDs of
course. For any who want to produce their own digital video recordings, the latest generation of camcorders enable you to do this. Popular video file formats have the extensions .wmv, .avi, .mpg and many more.

* Audio: It refers to speeches, music and other types of sound. Audio element is generally used to enhance the usual multimedia environment, but in some cases may become more effective than all other media put together. The most common sound files have extensions like .wav or .wma.

* Photographs and pictures: Digital photographs are now very common and can be made yourself on almost any digital camera. The tricky job is often getting these into a computer where they can be incorporated into a multimedia project. The best advice we can give is for you to follow the instructions that came with your camera. Photographs can also be scanned into your computer in the same way as pictures.

Digital imaging software can be used to alter your pictures. Sometimes this is supplied with either your camera or computer. Once again, it may take some time to become proficient in the use of this. Photograph files have extensions such as .jpg, .tif, and others.

1.3.3 Tying It All Together with a Computer

To link them all together in the modern world of Technology we need to have a computer. To actually produce multimedia we need to have a fairly powerful computer, along with some quite sophisticated software.

1.3.3.1 Hardware for a Multimedia Computer

A typical multimedia computer usually include devices like CD-ROM player, sound card such as Sound Blaster, Master Blaster and sometimes a microphone and a range of multimedia software. And probably with either MIDI (Musical Instrument Digital Interface) a standard interface can be in hardware or software which is used for playing a digital instrument through PC interface on the card as an add on utility. Let us look into the requirements of hardware for a multimedia PC. Figure 1.3 gives the diagram of such requirements.
One cannot record video using such a system. For doing recording one require overview of additional equipments such as digital video camera. However, once various Multimedia components of multimedia are recorded in the required format, this machine can be used to put various pieces together to form a multimedia information system.

i) **CPU**

   The CPU which is recommended for a multimedia computer should be Pentium Processor on a PC or other advanced chips such as PowerPC etc. Apple Macintosh and Silicon graphics have their own set of powerful processors for multimedia. However, the CPU of multimedia computer should be at least 486 with math coprocessor attached otherwise the response time of multimedia will be poor. The coprocessor chip greatly reduces the load of the CPU. The powerful co-processor chip added for supporting graphics is called graphics accelerator. The memory capacity for such a machine should be 8 MB or above. A 16 MB memory enhances the performance of a Multimedia machine by 50% over 8 MB machines.

ii) **Monitor**

   The multimedia PC should be equipped with a monitor having Super Video Graphics Arrays (SVGA) card. The basic advantage of having SVGA is that it has a better Resolution, thus, the display will be of better quality for the
graphics and pictures. A typical representation which may be used in multimedia can be 720x640 or 1200x680 etc.

iii) Input-Output Devices

Keyboard and Mouse are two important components for any multimedia PC. Since Multimedia computers are accessed using a graphical user interface therefore; mouse is an essential input device for it. Here special mention is to be made about two important input-output devices. These are the sound speakers, which produce sound output and microphones, which are used for on-line recording of sound using various multimedia software.

In addition to this, multimedia also supports MIDI interface, thus, a digital musical instrument can be connected to it on the socket provided for it. This audio interface normally allows data transmission using DMA channels, that is, it does not require the intervention of the CPU while transferring digital data to memory.

Some of the newer machines are coming up with a TV board, which is installed inside the computer and allows connection of VCR/video Camera/Cable connection. This TV board can be operated with the help of software, which are normally provided with this board. Thus, we can watch TV programmes on the multimedia machine. However, please note that this interface does not allow digital recording of video on to your computer. This interface is meant only for the purpose of display if we want to capture these video frames a video capture board is to be added in the multimedia PC.

iv) CD-ROM

Multimedia uses digitized audio and video which not only take huge amount of storage space, but also required high speed storage media, which can send large amount of data back and forth quickly to keep audio and video playing and recording smoothly. Because of this requirement most of multimedia packages uses hard disk drive, which Offer high speed, high data throughput, and plenty of storage devices like 1 GB or More. Sometimes, two or more hard disk drives are used as an array to work together so that they act like a single hard drive.
However using a disk array of two or more disk for multimedia storage, can no doubt Boost the processing speed for the multimedia element, but these are not durable in Nature.

Magnetic optical disk media offer large amount of storage in a durable package. CD-ROM is now widely used for multimedia storage as it has an amazing amount of flexibility and potential as a multimedia storage and distribution medium. One CDROM can hold up to one and half hour of digital audio or around 700 to 750 MB of computer data for that matter.

v) Sound Card

Sound output from a computer has been a feature of machines usually used for sending warning error message or games. If better quality and capabilities for sound output or inputs are required, then there must be a device, which can be added to the basic machine. This device is known as Sound Card, which is added to the basic machine by inserting it in free slot.

The most common reason for adding a sound card to a PC is to be able to use multimedia fully by recording and playing back the digital audio. While selecting an add on sound card, quality of sound from the loudspeaker has to be taken into consideration and the software provided with a sound card should be adequate enough to suit your requirements for handling sound effects in multimedia.

vi) Laser Disc

Like CD-ROM, a laser disc uses the same recording media. It can record and play back high quality digital audio files. As compared to the CD-ROM, a laser disc can play back four channels at a time (two digital and two analog channels) whereas CDROM can play only two channels at a time. CD-ROM stores digital data on only one side of the disc, whereas the laser disc stores an analog video signal on both sides of the disc. But the biggest difference between them is that laser disc stores video in analog form.

The disadvantages of using a laser disc are like any other video source. The only plus point being that you can access video from any location on the disk. The older multimedia systems used to have a laser disc under computer
control for playing video; they used to have a separate TV screen in addition to a computer screen. Laser Disc is old technology; the DVD has replaced it.

vii) DVD

DVD is the cohesion of multimedia and digital video player, movies and interactivity. By employing the latest advances in digital technology, DVD can hold up to 25 times more digital info than a CD-ROM and DVD can be used to create innovative, cutting edge videodiscs with all sorts of data including director's cuts, photo galleries, interview with actors in fact practically anything today's video producers can imagine. Using DVD technology, besides multilingual capabilities of DVD the producers can create a limitless range of interactive titles, instead of watching a video in the linear fashion as with traditional videotape. Originally it was felt that DVD is the short for Digital Video Disc but now it is more commonly referred to as "Digital Versatile Disc" as it has many potential applications than video.

The new multimedia storage format of choice, DVD is more than just a high quality video formatting. DVD-ROM can combine hours of stunning video, audio and music with computer data and instructions to offer high capacity media-rich games with exceptional video quality, specialized educational and entertainment programs, software libraries, and training programs, digitized photo collections and, of course, high quality interactive encyclopaedias and interactive experiences, all on a single disk.

viii) Latest Invention A USB flash drive

A USB flash drive is a data storage device that includes flash memory with an integrated Universal Serial Bus (USB) interface. USB flash drives are typically removable and rewritable, and physically much smaller than a floppy disk. Most weigh less than 30 grams.

As of September 2011, drives of up to 256 gigabytes (GB) are available. A one-terabyte (TB) drive was unveiled at the 2013 Consumer Electronics Show and will be available during 2013. Storage capacities as large
as 2 TB are planned, with steady improvements in size and price per capacity expected. Some allow up to 100,000 write/erase cycles, depending on the exact type of memory chip used, and a 10-year shelf storage time.

USB flash drives are often used for the same purposes for which floppy disks or CD-ROMs were used, i.e., for storage, back-up and transfer of computer files. They are smaller, faster, have thousands of times more capacity, and are more durable and reliable because they have no moving parts.

USB flash drives use the USB mass storage standard, supported natively by modern operating systems such as Linux, Mac OS X, Windows, and other Unix-like systems, as well as many BIOS boot ROMs. USB drives with USB 2.0 support can store more data and transfer faster than much larger optical disc drives like CD-RW or DVD-RW drives and can be read by many other systems such as the Xbox 360, PlayStation 3, DVD players and in a number of handheld devices such as smart phones and tablet computers.

1.3.3.2 Software for a Multimedia Computer

To produce multimedia media elements, there are various software available for the user, such as Paint Brush, Photo Finish, Animator, Photo Shop, 3D Studio, Coral Draw, Sound Blaster etc. Software also available to combine these independently created media elements. Some of these software are IMAGINET, Apple Hyper Card, Authbware Professional Icon author, Multimedia Director etc. Software for Multimedia among various types also include software for creation of graphics, animation etc. Designer, Corel Draw, Picture Publisher, Photo Magic, Animator pro etc. are most commonly used programs. Designer is one of the professional rating drawing and graphics package for windows, which is also available in OS/2 system. It is specially meant for graphic artists and technical illustrators. It has a wide range of drawing tools and powerful text handling features. Similarly Photo Publisher is a professional photo retouching or image-editing package designed to enable retouching and enhancing photos faster.
It has powerful masking and retouching tools and more than 30 special effects and filters. It has an image browser, processor, scanner, printer calibration, a stitching tool and over 50 ready to use textures and images. Similarly other multimedia related software also works on the same type of working environment, but they have their own features to experiment upon. Some of the recent software used in multimedia industry are:

- **Photoshop:** Industry standard digital imaging software,
- **Director:** Authoring multimedia for CD-ROM & the Web
- **Premiere:** Digital video and post-production tool
- **Sound Edit:** Sound capture and editing for multimedia, music or the net
- **Flash:** Vector-based animation tool
- **Front page:** Authoring tool for intranets and the WWW.
- **Alias | Wave front:** 3d tools for games, films.

### 1.3.3.3 Multimedia Extension in windows

To provide all PC the same standard to multimedia, Microsoft developed multimedia extension for Windows operating environment. This feature add several multimedia capabilities to the Windows operating system, including Resource Interchange File Format (RIFF), a standard format for multimedia data including Bitmap, graphics, animation, digital video and audio recording and playback facility for digital audio. It also includes MIDI (Musical Instrument Digital Interface) files and MCI (Media Control Interface) to interface one's work with external devices such as CD-ROM, Sound card, laser disc players etc. Most of the multimedia extension software for Windows works in the background. The utilities like MIDI mapper, sound recorder and media player are the direct interface to the software the multimedia extension for Windows.

In the present environment there are many files formats existing for multimedia in Widows and Internet. The table 1.2 shows the details on these multimedia Formats.
### Multimedia Files Formats

<table>
<thead>
<tr>
<th>File Extension</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVI (Audio Video Interleaved)</td>
<td>Video With Sound track accessible through Windows media player.</td>
</tr>
<tr>
<td>BMP (Bitmap)</td>
<td>Graphics, accessible through windows Paintbrush</td>
</tr>
<tr>
<td>FLC, FLI (Flick)</td>
<td>Animation, a format started by Autodesk. That can be played back from a wide variety of graphics software.</td>
</tr>
<tr>
<td>JPG (JPEG: Joint Photo Expert Group)</td>
<td>Photos: High quality photographs stored Using a special graphics compression format.</td>
</tr>
<tr>
<td>MFF (MIDI File Format)</td>
<td>Music: A slightly abbreviated MIDI Format designed for Microsoft windows, accessible through media player.</td>
</tr>
<tr>
<td>MOV (Quick time)</td>
<td>Video: A video format that originated on Apples Macintosh computers, now in windows too.</td>
</tr>
<tr>
<td>MPG (MPEG: Motion Expert Group)</td>
<td>Video: A highly compressed format Requiring special pictures hardware and software for DOS playback and recording.</td>
</tr>
<tr>
<td>PCD (Photo CD)</td>
<td>Photos: Photographs stored on Kodak Photos CDs, accessible by Kodak's own software.</td>
</tr>
<tr>
<td>PCX (Picture Paintbrush)</td>
<td>Graphics: A popular format accessible by Most graphics programs, including paintbrush.</td>
</tr>
<tr>
<td>Tif (TIFF: Tagged Image File Format)</td>
<td>Graphics: A format popularized by Aldus PageMaker for moving graphics between different types of software and computers, often used by scanners.</td>
</tr>
<tr>
<td>VOC (Creative Voice)</td>
<td>Sound: Sound Blaster cards record sounds in the format</td>
</tr>
<tr>
<td>Wav (Waveform)</td>
<td>Sound: Windows preferred format for Storing recorded sounds</td>
</tr>
</tbody>
</table>

Multimedia materials that have already been created, the requirements are not so great. Most multimedia developers will want to ensure that the final product is something that can be seen and used by as wide an audience and on as many different computers as possible.
1.3.4 Multimedia by Using Computer

1. Desktop Publishing:
This is really a misleading term, but it is one that is commonly used to describe a range of software that started to appear in the mid-1990s.

It is not actually “publishing” software since things are not published on the desktop, but it is a very useful and powerful tool that enables the user to prepare materials ready to be published – either on a printing press or simply photocopied. So it is actually a graphic design and layout tool. But we can refer to it as multimedia, since it does enable more than one of the raw bits that we talked about earlier to be combined together. What desktop publishing enables us to do is combine text and images (including pictures, drawings, photographs, graphs, charts, tables, etc) together in the one document and then move them around the page so as to make them look attractive and easier for the reader to use. To become a good desktop publisher, the user needs to have a good knowledge of design and he need to know what works well in terms of layout. Some of the best known desktop publishing software programmes are:

* Adobe In Design  
* Adobe PageMaker  
* Microsoft Publisher  
* Microsoft Word  
* Open Office  
* Scribus

2. Presentation Software:
Presentation software is also a form of multimedia. The most common one around is probably Microsoft PowerPoint. Again, the software enables pictures and text to be combined in the one place, but this time we have the added possibility of incorporating both sound and movies. Really effective presentations also depend on good layout and design. It is well worth while noting those you see that are impressive in this respect, and try to remember those features that make it good. Then try to incorporate
them in your own presentation. A free alternative to PowerPoint is the Open Office Presentation programme. This programme will also create presentations of a multimedia nature and will also open most presentations that have been created in PowerPoint. It is important to remember that presentation software is really intended for showing to an audience. They do work for individual viewing of course, but their main purpose is to present things to a group, usually as support for a spoken commentary.

3. **Portable Document Format files:**

PDF files, as these are generally called, are produced from other documents that have been created in other programmes.

Most desktop publishing programmes, as well as word processors and presentation programmes, enable you to export the finished file as a PDF document. The word “export” means that you can convert the file into PDF form. The main advantage of a PDF file is that it can be viewed on almost any computer, provided that the software known as Acrobat Reader is installed on it. And Acrobat Reader is available for free. But PDF files have some other features as well:

1. They can link to other multimedia elements such as sounds, videos, internet sites and other files. But to make these links you need to have a more advance version, known as Adobe Acrobat, installed. And this is not free.
2. PDF files are quite difficult to edit or change once they have been created. For this reason they are often used in situations where you do not want the reader to be able to alter them.
3. They can also be made in varying file sizes. If the file is to be distributed via the internet, for example, its size needs to be small, so that it can be downloaded easily by a viewer. The quality of the image will be not as good in this instance.
4. **Interactive e-Books:**

One method we are using to make multimedia resources available here in Samoa is to develop what are referred to as interactive e-Books. Essentially, these are electronic books that are based on the textbooks used by most secondary schools in the country. Here are the covers of some of them.

![Book Covers](image)

The electronic version of these books is in the form of PDF documents. So you will need Adobe Acrobat Reader on your computer in order to be able to view them. Each book is on one DVD. The pages in the electronic books look very similar to the ones in the printed books, but we have made a few changes to them. The changes are simply to enable you to use the multimedia resources that are included with the DVD.

5. **Internet:** The internet is a world wide web. It is publicly accessible series of interconnected computer network that transmit data by packet switching using the standard internet protocol (IP). This is, without a doubt, the biggest resource of all, and is capable of providing a wealth of learning experiences to all students.

1.3.5 **Communication Technology and Multimedia Services**

The advances of computing, communication and creation of relevant standards have lead to the beginning of an era where people getting multimedia facilities at home. May be in the form of an Interactive T.V. or through the World Wide Web. These services may include:

- Basic Television Services (Gyan Darshan, Tarang etc.)
- Interactive entertainment
• Digital Audio
• Video on demand
• Interactive single and multi user games
• Digital multimedia libraries
• Electronic versions of newspapers, magazines etc.

Cable TV and telephone companies, dot com companies, publishing industry etc. are the main infrastructure providers for these facilities. The networking technology along with the improved compiling and compression technologies are delivering interactive services profitably. The entertainment cable, telephone, and Internet passed industries Companies are trying to design wide variety of such multimedia services. Today Personal Computers are the tool that promotes collaboration. They are essential to any multimedia workstations. Many high-speed networks are in place that allows multimedia conferencing, or electronic conferencing. Such facilities are even available today through Internet also. Today, we have to depend on our telephone to link us with others, whether it is a phone call or a group audio conference or dialup Internet connection. However, tomorrow it will be sort of based links that link us with others. A Computer-based multimedia conference allows us to exchange audio, text, image, and even video information. It also facilitates group development of documents and other information products. Let us discuss more about these concepts in greater details.

1.3.6 Advantages of Implementing Multimedia in the Classroom

* Motivation - Today’s students need to be motivated to learn now more than ever before. Multimedia incorporates learning with entertainment. For the most part, students just enjoy working on computers thereby making learning fun.

* Learning styles – Multimedia allows teachers to address various learning styles in the classroom. Students can see, hear, and imagine what things feel like as multimedia is used to bring a subject to life.

* Technology standards – Technology is an important aspect of life today. Students must be ready to compete in a highly technological world.
* Access to limitless resources for teaching and learning – Teachers are no longer limited to textbooks as vast amounts of knowledge and teaching ideas may be explored.

* Student centered learning – Students will show accountability for learning when collaborative activities or project based learning is implemented through technology.

* Multimedia allows differentiated instruction - Having different ways to present information to the students allows teachers to meet the needs of all students. Teachers are able to step back and be the facilitator while students are engaged in group projects.

* Multimedia is a great way to make sure the lessons are organized. There are many tools that we can use to help organize our presentation, therefore making it easier to understand.

* Exposing the students to the real world- Students are going to be required to use multimedia in their jobs one day and by exposing them at an early age institutions are preparing them for the future.

* Multimedia is that is can enhance concepts that are not as interesting as others. There are many ways that the web can turn a not so interesting topic into something the students are willing to learn.

* Life long skills - Many of the skills required to participate in a multimedia project are the same used on a daily basis outside of school and in college.

* Higher level thinking skills- Multimedia projects can raise the level of understanding and application of a subject matter.

* Pictures speak a thousand words- Learners with other disabilities can get a lot out of the project by possibly listening to part of the information while seeing a picture that relates to the words.

* Classroom management- Class web sites can provide “one stop shopping.” Handouts, assignments, rubrics can all be accessible to students whenever they may need further information. This is also handy for students to complete their work whenever it is convenient for them.
* Improves Traditional Audio-Video Presentations- Audiences are more attentive to multimedia messages than traditional presentations done with slides or overhead transparencies.

* Increase in comprehension- Full interaction with the user which creates greater comprehension and higher level thinking skills.

* Helps students to retain and increase the learning because they are engaged, using more than one sense, provides scaffolding, visuals, and higher order thinking.

* Educators can adapt the multimedia presentation for those students that may be physically challenged. Students with hearing impairments, or physical disabilities will be able to use the hardware adaptations necessary to succeed with the programs.

* Language barriers can be knocked down by using any of the language transition facilities, thereby allowing students to use their knowledge in their own language and then translate for the educator to understand or vice-versa.

* Multimedia presentations allow students to work at their own pace, teachers are able to implement IEPs more easily. Teaching assistants and non-teaching assistants can help differentiated during special tutoring time.

Thus Meaningful learning occurs when a learner selects relevant information, organizes it into coherent representations, makes connections among corresponding representations in each channel and builds mental representations from the words and pictures. A well designed educational multimedia presentation incorporates the use of both auditory and visual channels in order to increase the memory input capacity and employs the multimedia design principles to select and organize the relevant information to assist learners to build more coherent representations of the concepts. Extensive research supports the assertion that multimedia instruction can foster learning and improve problem solving skills; more specifically, the research indicates that multimedia-based instruction is more likely to trigger the cognitive processes associated with active learning than listening to a verbal explanation.
or reading the text. For example, if the verbal explanation or reading is not accompanied by visual representations, students are often unable to remember most of the key ideas or to apply the concepts to similar situations. With multimedia tools, instructors can integrate the power of the visual and the verbal modes of presenting concepts to enhance student learning. Furthermore, students learn more deeply when words are presented in conversational rather than formal style.

1.3.7 Multimedia the base of Smart Educational Institutes & Smart Classes

Over the last few decades, everything has changed in our lives with the all pervasive intervention of technology. However classrooms have remained untouched by technology. The classrooms that our grandparents went to are exactly the kind of classrooms our children study in. Chalk and blackboard, a packed classroom, text books, regimented curriculum, a teacher painstakingly explaining abstract concepts with the limited tools at her disposal.

Imagine a Science teacher explaining how a DNA replicates, a History teacher teaching a class about the Harappan Civilisation, or a Geography teacher teaching how Block Mountains are formed. The best of teachers take pains to explain the concepts largely depending on their own abilities.

The students listen to the teachers, try to decipher the figures drawn on the blackboard and read from their text books, take notes and try hard to visualize how it happens and remember. At the end of the class, the teacher asks a few random questions to assess how the class fared. Invariably a few hands (mostly of the same set of brightest students in class), go up, the answers are given and the class ends.

Smart class room brings about a complete transformation in classrooms. The Science teacher while explaining how a DNA replicates is able to show the class a 3D animation of the DNA replication process on a large screen. Similarly the History teacher shows the class a virtual walk through of the Harappan Civilisation. Uncovering the relevant parts step by step as a part of her lesson plan, while the Geography teacher shows a virtual Block mountain being formed all with engaging animations, colors, music, sounds
and voice. The teachers gain complete attention and interest of every child in the class. Every child gets a visual input on how it happens and the concepts are well understood and internalised.

Towards the end of the class, every teacher displays a set of questions on a large screen; every child in class gets ready to answer the questions with their personal answering device – SAS. Students click the answers, instantly; teachers are able to get a score sheet for every child in class.

This results in faster and accurate understanding of the concepts in class and helps improve the overall academic performance of students. Teachers are able to keep students engaged in the learning process Improves teacher effectiveness and productivity in class.

A View of Multimedia Smart Class Room

![A View of Multimedia Smart Class Room](image)

**1.3.7.1 Benefits of Smart Class Rooms**

* It brings abstract and difficult curriculum concepts to life inside classrooms.
* Makes learning an enjoyable experience for students.
* Improves academic performance of students.
* Enables instant formative assessment of learning outcomes in class.
* It also enables teachers to instantly assess and evaluate the learning achieved by their students in class.
* Teachers can also create their own smart tests and use them in the class for assessment. For this purpose, a Test Authoring Tool has been added to the smart class assessment application.
1.3.8 Practical disadvantages of Multimedia in the Class Room

Multimedia requires high-end computer systems. Sound, images, animation, and especially video, constitute large amounts of data, which slow down, or may not even fit in a low-end computer. Unlike simple text files created in word processing, multimedia packages require good quality computers.

A major disadvantage of writing multimedia courseware is that it may not be accessible to a large section of its intended users if they do not have access to multimedia-capable machines. For this reason, courseware developers should think very carefully about the type of multimedia elements that need to be incorporated into applications and include only those that have significant value.

Multimedia has other weaknesses too. While proponents of this new technology are very enthusiastic about its potential, they often leave the financial and technical issues unattended. Development costs in multimedia are very high and the process of developing effective multimedia takes time. Time spent on developing the multimedia package requires money so that the true cost of an interactive programme mounts with each delay.

Further, if the prerequisites for using multimedia include to computers with related software, the user must possess a minimum level of computer literacy in order to exploit the capabilities of this medium for learning.

And finally, of the educator who is unfamiliar with the production and design of multimedia courseware or packages can be equally complicating.
1.4 COGNITIVE STYLES

Cognitive style historically has referred to a psychological dimension representing consistencies in an individual’s manner of cognitive functioning, particularly with respect to acquiring and processing information. Ausburn & Ausburn (1978), Messick (1976) defined cognitive styles as stable attitudes, preferences, or habitual strategies that determine individuals’ modes of perceiving, remembering, thinking, and problem solving. Witkin, Moore, Goodenough, and Cox (1977) characterized cognitive styles as individual differences in the way people perceive, think, solve problems, learn, and relate to others.

The development of cognitive style research is an interesting and paradoxical topic in the history of psychology. Starting in the early 1950s, a tremendous number of studies on style types appeared in both the theoretical and applied literature all aimed at identifying individual differences in cognition that are stable, value free, and related to personality and social relationships. Gardner (1954) assessed cognitive style studies as “a huge forward step in the understanding of the relations of personalities to their environment, a new step toward the maturity of American psychological science” (in Witkin et al., 1954). Nevertheless, in the 1970s, cognitive style research began to lose its appeal. The field was left fragmented and incomplete, without a coherent and practically useful theory and with no understanding of how cognitive styles were related to other psychological constructs and to cognitive science theories.

1.4.1 Introduction of the Cognitive Style Concept

The first experimental studies revealing the existence of individual differences in simple cognitive tasks involving perception and categorization were conducted in the 1940s and early 1950s (Hanfmann, 1941; Witkin & Ash, 1948; Klein, 1951; Klein & Schlesinger, 1951; Witkin, 1954).

Hanfmann (1941) showed that some individuals used a perceptual approach when grouping blocks whereas others used a more conceptual approach, trying first to formulate hypotheses about possible groupings. Witkin
and Ash (1948) reported significant individual differences in the way people perceive the “upright” orientation of a rod in different surrounding fields in a task called the Rod-and-Frame Test. Witkin and Ash found that some subjects perceived the rod as upright only when it was aligned with the axes of the field whereas other subjects were not influenced by the field characteristics.

Klein (1951) studied how accurately people made judgments about changes in perceptual stimuli. Subjects received projected squares that constantly changed in size. Klein identified two types of individuals: sharpeners, who noticed contrasts and maintained a high degree of stimulus differentiation; and levelers, who noticed similarities among stimuli and ignored differences.

The main contribution of these early studies was to identify robust individual differences in the performance of simple cognitive tasks and to demonstrate that people differed in their overall success and in the ways in which they perceived and solved the tasks. At that time, there was no established label for these individual differences; they were called perceptual attitudes, patterns, predispositions, cognitive attitudes, modes of responses, or cognitive system principles (Holzman & Klein, 1954; Gardner, Holzman, Klein, Linton, & Spence, 1959). The notion of cognitive style was introduced by Klein and Schlesinger (1951) and Klein (1951), who were interested in possible relations between individual differences in perception and personality.

Klein (1951) was the first to consider cognitive styles (he called them “perceptual attitudes”) as patterns of adaptation to the external world that regulate an individual’s cognitive functioning. “Perceptual attitudes are special ways, distinctive for the person, for coming to grips with reality.”

According to Klein, the process of adaptation requires balancing inner needs with the outer requirements of the environment. To achieve this equilibrium, an individual develops special mechanisms that constitute his or her “ego control system” (Klein, 1951, p. 330). Cognitive style expresses “a central or executive directive of the ego-control system . . . and it acts very much as ‘a selective valve’ which regulates intake – i.e. what is or not to be
ignored” (Klein, 1951, p. 333). Klein considered both poles of the leveling–sharpening dimension as equally functional (i.e., each pole is a means for individuals to achieve a satisfactory equilibrium between their inner needs and outer requirements). In leveling, the purpose is the obliteration of differences; in sharpening, it is a heightened sensitivity to them. Several years later, Holzman and Klein (1954) defined cognitive styles as “generic regulatory principles” or “preferred forms of cognitive regulation” in the sense that they are an “organism’s typical means of resolving adaptive requirements posed by certain types of cognitive problems” (p. 105).

Witkin et al. (1954) conducted a large experimental study that played a crucial role in the further development of cognitive style research. The goal of Witkin’s study was to investigate individual differences in perception and to associate these differences with particular personality tendencies.

In Witkin’s study, subjects received a number of orientation tests aimed at examining their perceptual skills, such as the Rod-and-Frame Test, in which subjects determined the upright position of a rod; the Body Adjustment Test, in which subjects judged their body position in different fields (e.g., defining their body position in rooms with tilted walls and chairs); and the Rotating Room Test, in which subjects adjusted a room to the true vertical position.

In addition, subjects received the Embedded Figure Test, in which they identified simple figures in a complex one. Witkin et al. used a broad spectrum of methods to examine the personality characteristics of their subjects, including autobiographical reports, clinical interviews, projective tests, and personality questionnaires. Witkin et al.’s main finding was that individual differences in how people performed the perceptual tasks were stable over time and across tasks. Two groups of subjects were identified: field dependent (FD)—those who exhibited high dependency on the surrounding field; and field independent (FI)—those who exhibited low dependency on the field.

It is worth mentioning that they found a large intermediate group of subjects who did not fall into either category. There were also significant relations among subjects’ performance on perceptual tests, their personality

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characteristics, and their social behavior. The FD group made greater use of external social referents in ambiguous situations than did the FI group and were more attentive to social cues.

In contrast, the FI group had a more impersonal orientation than the FD group, exhibiting psychological and physical distancing from other people (Witkin & Goodenough, 1981). Witkin, (1964) explained individual differences in perception as the outcome of different modes of adjustment to the world, concluding that both FD and FI groups have specific components that are adaptive in particular situations.

According to Witkin, Dyk, Faterson, Goodenough, and Karp (1962), field dependence reflects an early and relatively undifferentiated mode of adjustment to the world, whereas field independence reflects a later and more differentiated mode. Although field independence is generally related to higher performance on perceptual tasks as well as higher growth in psychological organization, it is the integration of a psychological system, not differentiation that reflects the effectiveness of the system’s adjustment to the world. That is, a highly differentiated FI individual may be very efficient in perceptual and cognitive tasks; however, she or he may exhibit inappropriate responses to certain situational requirements and be in disharmony with his or her surroundings. Both Klein (1951) and Witkin et al. (1977) viewed cognitive styles as patterns or modes of adjustment to the world that appear to be equally useful but rely on different cognitive strategies and can result in different perceptions of the world.

Furthermore, Klein clearly emphasized the control aspect of cognitive styles and their guiding function in an individual’s activity, coming close to the concept of cognitive executive functions, which determine when, where, and in what manner an individual uses particular cognitive strategies or skills. Although Witkin’s position regarding integration and adjustment is similar to Klein’s. Witkin and his colleagues did not fully elaborate their theory, and this resulted in much confusion in the field. As we will see, this confusion permeated subsequent research, causing arguments about whether opposite
poles of style dimensions are equally valuable or whether some, such as field independence, sharpening, narrow categorization, and others, are indicators of relatively high levels of intelligence.

Cognitive Styles are, what many educators are discussing, when they are the term "learning Styles". 'Cognition' covers various modes of knowing, perceiving, imagining, remembering, conceiving, judging and reasoning. The notion of Cognitive Styles grew out of research on how people perceive and organise information from the world around them. These studies show that individuals differ in how they approach the experimental tasks but these variations do not reflect levels of intelligence or pattern of special abilities (Tyler, 1974).

Cognitive Styles is a broad dimension of individual differences that extends across both perceptual and intellectual activities.

Cognitive Styles refer to the modes an individual employs in perceiving, organising and labelling various dimensions of the environment. Thus, it may be said, Cognitive Styles appear to reflect consistencies in the manner or form of cognition, as distinct from the content of cognition or the level of cognitive skills displayed. Cognitive Styles as the preferred use of a specific class of conceptual responses, whereas for Shuell (1981), Cognitive Styles refers to the “preferred ways that different individuals have for processing and organising information and for responding to environmental stimuli.”

The term 'Styles' is used because what is at issue is the characteristic' approach an individual brings with him to a wide range of situations. Since the approach encompasses both his perceptual and intellectual activities, it is called his 'Cognitive Styles'.

Cognitive Styles are often described as falling on the borderline between mental abilities and personality traits (Shuell, 1981). They are Styles of "thinking" and thus are probably influenced by and in turn influence cognitive abilities (Brodzinsky, 1982). Cognitive Styles reflect aspects of personality as well as cognition. Thus, although they function to control and regulate the course of information processing and are typically measured as response
consistency on cognitive tasks" their operation may be in the service of underlying personality traits for such dynamic themes as anxiety over error', expectancy of success and failure and vulnerability to distraction which are central to many of the measures utilised in their assessment.

It has been observed that certain individuals tend to respond very quickly in most situations (impulsive Cognitive Styles); others are most reflective and slower to respond (reflective Cognitive Styles), even though both types of individuals are equally knowledgeable about the task at hand. Cognitive Styles, thus, suggests that individuals approach the same task in different ways but these variables do not reflect levels of intelligence or patterns of general abilities.

Although, defined as modes of information processing, Cognitive Styles are not simple habits in the technical sense of learning theory, for they are not directly responsive to principles of acquisition and extinction. They develop slowly and do not appear to be easily modified by specific training. Research reveals that Cognitive Styles exhibit stability and persuasiveness across diverse spheres of behaviour that though they entail generalised habits of information processing, they are intimately interwoven with affective, temperamental and motivational structures as a part of the total personality. Thus, it may be said that the manifestation of a core personality structure in cognition is Cognitive Styles. Under Cognitive Styles, Messick (1976) includes dimensions such as the following:

Field independence versus field dependence (responding to the environment in analytical as opposed to global terms), cognitive complexity versus simplicity (the tendency to construct the world in a multidimensional or abstract was as opposed to a single dimensional or concrete way); reflection versus impulsivity (differences in the speed and adequacy with which alternative hypotheses are formulated and information is processed); risk taking versus cautiousness (individual differences in a person's willingness to take chances to a desired goal); and sensory modality preferences (individual differences in relative reliance upon the visual or auditory sensory modalities).
Research suggests that Cognitive Styles may be related to learning. Instruction can be improved when it is based upon Personality Type, Intelligence level and process oriented Cognitive Styles that are related to knowledge about the encoding strategies of the brain.

No single strategy or model of teaching aims as enhancing creative problem solving skills or developing brain potential. A combination of models, which share many features, is perhaps a useful approach to work out a system of teaching in this context. Inquiry model (Suchman, 1966) or Inductive Teaching Model (Taba, 1966) or most importantly the synectics model (Gordon, 1961) will have to be considered seriously to arrive at a meaningful model for the teaching of right brain. Torrance (1965) conducted a good deal of research on class-room nurturance of creativity and suggested that creative skills of students can be enhanced. A number of research studies have been conducted in the past in this area.

### 1.4.2 Characteristics of Cognitive Styles

Satterly (1992) suggests three features of cognitive Styles. Styles are intellectual characteristics of individuals; they describe processes, which are relatively stable over time. Their essential characteristics in general have been given by Witkin et al. (1977). According to them cognitive Styles are concerned with the form rather than the content of cognitive activity.

- These refer to individual differences as to how we perceive, think, solve problems, learn and relate to others.
- They are persuasive dimensions but cut the boundaries traditionally used in compartmentalising the human psyche and so hold to restore the psyche to its status as holistic entity.
- They are stable over time, it is not that they are unchangeable; some may be rather easily altered. This stability makes stylistic dimensions particularly useful in long range guidance and counselling.

In addition, with regard to value judgments, cognitive Styles are bipolar and range from one extreme to the opposite extreme wherein each end of the dimension has different implications for cognitive functioning. Each pole, thus,
has adaptive value under specified circumstances and may be judged positively in relation to those circumstances.

Cognitive Styles differ from intellectual abilities in a number of ways. Whereas ability dimensions refer to the content of cognition or the question of (what kind of information is being processed by what operation in what form). Cognitive Styles bear on the question of 'how'? (In which manner behaviour occurs). While the concept of ability implies the measurement of capacities in terms of maximal performance, that of cognitive Styles implies the measurement of preferred modes of operation in terms of typical performance.

Another way in which they differ from intellectual abilities is in the values usually placed upon them. While high quantitative aptitude may be quantitative aptitude, we would hardly have the same general preference for impulsive, as opposed to reflective cognitive dimension. Neither cognitive Styles dimension is uniformly more adaptive. Rather their adaptiveness depends upon the nature of the situation and upon the cognitive requirements of the task at hand. This has important implications for education since it serves to establish that cognitive Styles are usually not considered as outcome objectives of educational or training programmes except possibly for younger students.

Cognitive Styles are important to be considered as input variables that might moderate the operation and effectiveness of educational/training programmes or interact with programmes or components to produce differential results. Each of an individual cognitive dimension has been found to correlate with certain intellectual tasks and the ability to learn and perform in school of the many listed cognitive Styles identified by researchers over the years, a few prominent ones that are used to prepare cognitive profiles of individuals are field dependence/independence (more recently termed analytical-global), reflectiveness versus impulsivity, leveling versus sharpening, tolerance versus intolerance, focus-non focus, broad-narrow and fixity-mobility. Out of these, field- dependence/ independence cognitive Styles has been the most widely researched and used.
Witkin et al. (1977) identified the field dependent-independence cognitive styles and it has been found to be directly responsible for wide variation in the way individual pupils react to learning situations. People who are field-dependent tend to perceive a pattern as a whole. They find it difficult to focus on any one aspect of a situation or to analyse a pattern into different parts. Field independent persons are more likely to perceive separate parts of a whole, and to be able to analyse a pattern according to its components.

Another important cognitive styles, on which students differ is impulsive versus reflectivity. Impulsive individuals have a fast conceptual tempo, work quickly, give quick responses, finish objective tests early, concentrate more on speed and in the process make a few errors. On the other hand, reflective individuals tend to deliberate a lot, consider the entire possible alternative at length, are slow and careful to respond to test items but are likely to make lesser number of errors since they tend to concentrate on accuracy rather than speed (Entwistle, 1981).

As with field-dependence, impulsive and reflective cognitive styles are not highly related to intelligence within the normal range. However as children grow older, they tend to become more and more reflective, and for school-age children, being more reflective does seem to improve performance on certain school tasks. Also for reflective children, the chances of failing in one of the early grades are much less than for impulsive children and students can be taught to be reflective by means of self-instructional training by scanning strategies.

Awareness of these varying styles of conceptualisation may help the teacher to understand, to some extent, the wide individual differences in the way pupils react to different instructional approaches (Biehler, 1978). For example, an analytical or field independent person will try to induce the inherent structure in a situation or to impose his own structure on it, rather than have structure imposed from without. At the other end, a global or field dependent person will prefer to have the structure provided, perhaps in the forms of detailed instruction.
Research evidence has been accumulating on the field dependence/independence cognitive Styles ever since the year 1952, when it was first identified by Witkin et al. (1954), who suggested that, a cognitive Styles approach may be profitably applied to a variety of educational issues. Cognitive Styles of field dependence/independence has resulted in the formulation of various concepts and methods and these are increasingly being applied to research on problems on education.

The construct has been related to intellectual functioning and to hemispheric functioning and these two variables have been related to each other. Research evidence reveals that individuals demonstrate pervasive self-consistency functioning and so the division into the perceptual and intellectual is hardly value in the study of cognitive Styles. Measures of field dependence have been reported to be significantly related to total standard intelligence test scores and this significant relationship is carried largely by those positions of intelligence tests, which require analytical functioning. Thus the relation is based on the expression of a particular Style of field approach in both.

As Witkin et al. (1977) suggests, the cognitive Styles approach can be profitably applied to a variety of educational issues. On the basis of some research, he identified the cognitive Styles of field-dependence/independence to be important for academic achievement. People, who are field-dependent tend to perceive as a whole of a situation or analysing a pattern into different parts. Field independent people are more likely to perceive separate parts of a total pattern and to be able to analyse a pattern according to its components.

The concept of field-dependence emerged, initially, from the studies of Witkin et al. (1954) on perception of the upright in space studies of RAT (room adjustment test), BAT (body adjustment test) and RFT (rod & frame test). Their tests demonstrated that an individual tends to be consistent perceptual function from test to test.

Therefore, the person, who is unable to maintain the "separateness" of his body from the surrounding field in the BAT, can not also determine the position of the rod independently of the titled form in RFT. A little later, they
found significant correlation between these orientation tests and RFT, which measure field-dependence in a purely visual paper and pencil situation, this test features the ability to perceive an item independently of its context and does not involve body position with the accumulation of research data, field dependence soon came to be regarded as the Perceptual component of a broader personality dimension designed as global versus articulated cognitive Styles or psychological differentiation (Witkin et al. 1977). Evidence indicates that this Cognitive Styles exhibits considerable stability through childhood and early adulthood and is related to a number of personality variables such as leadership and social conformity (Witkin et al., 1977), field-independence refers to a consistent mode of approaching the environment, in analytical as against global terms. It entails a tendency to experience items as discrete from their backgrounds and reflects ability to overcome the influence of an embedding context.

Some clear developmental trends are visible in Cognitive Styles. As children grow older, they generally become more field-independent, at least until the middle of their teens. Then development levels of until later adult life, when there is a tendency to become more field-dependent. Even with these changes, over the years people remain fairly stable in comparison with others in their age. So a person who tends to be field-dependent as a child may become more field-independent with age but may still be less field independent than peers who have also changed with age. People differ in the extent to which their perception is analytical. The field-independent person is able to break up the total field and attend to the relevant items, while withholding attention from irrelevant items.

Thus they tend to perceive figures, as discrete from their backgrounds. They are generally more facile on tasks requiring differentiation and analysis, whether in identifying the presence of logical errors or in understanding the point of a joke this analytical penchant leads to a high degree of differentiation of the self from its context. Field-dependent persons have trouble breaking information down into units and recombining the parts into new patterns. So,
the task of organising information from many different sources can be difficult for students who have a field-dependent Cognitive Styles. Such individuals cannot withhold attention from the context in which the relevant figure is embedded.

Each cognitive Style has advantages and disadvantage (Woolfolk 1987). It means that field-dependent individuals are superior in remaining social information, such as conversations or interpersonal interactions. They are often better in subjects like history, literature and social sciences. Field-independent people are better at analysing complex, unstructured material and recognising to solve problems and science & mathematics may be their stronger subjects (shuell, 1981). Accumulating research data points out that field-dependence/independence extends into psychological domains beyond cognition (witkin et al., 1977). Such individuals differ from each other in important personal characteristics and in inter-personal relations dependent individuals are more influenced by the attitude of an authority figure or peer group but the field-independent individuals are less responsive to the human content of an environment.

Evidence of differences in characteristics falling in the domain of social behaviour between field-dependent and field-independent individuals is impressive. Field-dependent (global) individuals tend to identify more with a group, are susceptible to external influence and markedly affected by isolation from other people. Taken collectively, the characteristics that distinguish persons, with contrasting Styles, suggest that relatively field-dependent persons are likely to be attentive to and make use of prevailing social frames of reference.

Since field-dependent persons are seen to be relatively sensitive to social cues and interested in what others say or do, it is hardly surprising that they should be generally better liked; perceived as being warm, tactful, considerate, socially outgoing and affectionate.

On the other hand, field-independent individuals tend to have a more orientation, 'not sensitive to social undercurrents', 'cold and distant with others' 'unaware of their social stimulus value' and individualistic. There is additional
Evidence that along with their impersonal orientation, field-independent persons are more likely to be interested in the abstract and theoretical.

Thus, these social domain characteristics of field-dependence/Independence can be linked up with classroom situations, so as to produce differences in achievement. Research evidence has more or less established match-mismatch in cognitive styles as a factor in teacher-student and other kinds of social interactions also, but whether it makes for better student learning is still an issue.

In Embedded-Figures Test determines a subject’s field dependence/independence based on the time they take to find a simple figure in a more complex visual field (Witkin et al., 1977 for examples). Subjects who were field dependent spent more time finding the figure while field independent subjects found the figure quickly. Most people fell on a continuum between being completely field dependent or field independent.

<table>
<thead>
<tr>
<th>Learning characteristics of field-dependent and field-independent Students</th>
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<tbody>
<tr>
<td><strong>Field-Dependent</strong></td>
</tr>
<tr>
<td>• Are better at learning material with social content.</td>
</tr>
<tr>
<td>• Have better memory for social information.</td>
</tr>
<tr>
<td>• Require externally defined structure, goals and reinforcement.</td>
</tr>
<tr>
<td>• Are more affected by criticism.</td>
</tr>
<tr>
<td>• Have greater difficulty learning unstructured material.</td>
</tr>
<tr>
<td>• May need to be taught to use memory aids.</td>
</tr>
<tr>
<td>• Tend to accept the organisation given and be unable to reorganise.</td>
</tr>
<tr>
<td>• May need more explicit instruction on how to solve problems.</td>
</tr>
</tbody>
</table>

(Adapted from field-dependent and field-independent cognitive styles—and their educational implications, Witkin et al.-1977)
The question—how to adapt teaching to the needs of individual students—has been studied and debated for years and some of the attempts to adapt instruction to individual interests, aptitudes, and styles have been made for honours courses, vocational courses, experiences in performing arts, cooperative work study programmes, independent study, programmed learning, team teaching, etc. Psychologists doing research on aptitude-treatment interaction have established that student differences do interact with the teaching method and that whatever the limitations or merits of each approach, no single method can be equally successful with all individuals in a class.

This does not, however, call for the introduction of individualized teaching with different methods designed for each one alone but does bring out the necessity and urgency of developing flexible instructional strategies that can reasonably fit the diverse requirements of different individuals in a classroom. Individuals having field-dependence or field-independence cognitive styles of those having high or low general mental ability.

If different pupils are to make the intellectual journey from a state of no knowledge in a subject to the mastery of fundamentals, they could do so by taking quite different instructional routes. Taking the same route might lead to great differences in progress among them and even to inordinate frustration and defeat for some. Thorough investigation of aptitude-treatment interactions potential for improving education and maximizing learning is a most important endeavor for educational researchers and psychologists.

The message that rings out clearly for teachers is that all differences in class performance, that are seen, are not due to differences in ability or efforts. Rather, they may be due, in part, to the individuals' preferred way of processing new information and to blind spots in one's approaches to new tasks or problems. Thus, differences in cognitive styles may offer as valid an explanation of differential achievement levels as those in mental ability. For these forceful reasons, the independent variable of cognitive styles, along with that of mental ability was chosen by the researcher to examine. If adaptation of teaching strategies to pupils' cognitive styles resulted in maximal learning or not.
1.5 ACHIEVEMENT MOTIVATION

Motivation is a psychological feature that arouses an organism to act towards a desired goal and elicits, controls, and sustains certain goal-directed behaviors. It can be considered a driving force; a psychological one that compels or reinforces an action toward a desired goal. Motivation is the purpose or psychological cause of an action. Motivation has been shown to have roots in physiological, behavioral, cognitive, and social areas. Motivation may be rooted in a basic impulse to optimize well-being, minimize physical pain and maximize pleasure. It can also originate from specific physical needs such as eating, sleeping or resting, and sex. Motivation is an inner drive to behave or act in a certain manner. "It's the difference between waking up before dawn to pound the pavement and lazing around the house all day." These inner conditions such as wishes, desires, goals, activate to move in a particular direction in behavior.

The term motivation is derived from Latin word 'Movere' or the 'Motum,' which means to move, motor and motion. It is the move towards set goals; therefore, motivation is a force, which energizes the behaviour of learners. Motivation has come to be regarded as one of the major domains of psychology and education. Motivation drives and directs behaviour. Achievement motivation governs behaviour relevant to achievement and learning.

Achievement Motivation is one type of motivation that helps to determine how and why an individual has behaved in a certain way. It investigates what gives some people “drive” and some don’t. This has lead to research and to the development of achievement motivation theory. The need for achievement has lead many researchers to investigate why and what makes people do and achieve different things. Many wanted to explain the factors involved in high and low achieving personalities. What emerged was not one theory or condition or behaviour, but that achievement motivation is best represented as a multidimensional construct (Ziegler, Schmukle, Egloff & Buhner, 2010).

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In broad terms achievement motivation represents an important construct in understanding an individual’s motivation to work hard on tasks, provide creative solutions to problems, and assess risk and to control uncertainty (Ziegler et al., 2010).

There have been a number of different theories developed about achievement motivation, described it as a trait-like characteristic influencing behaviour, specifically in relation to, excelling in a task and attaining a high standard, others theories include, goal theory and expectancy value theory. These all have strong elements of achievement motivation in them. However one model that has influenced a number of these theories has been the model of need for achievement (nAch) developed by McClelland (1965) who along with Atkinson and Murray first defined the theory of “need for achievement”, including its constructs and variables. McClelland considered the need for achievement as fundamental to achievement motivation. McClelland saw the need for achievement (nAch) related to competing with one’s own performance norms. He distinguished between hope for success and fear of failure (Ziegler, Schmukle, Egloff and Buhner, 2010).

McClelland stated that there were a number of variables that influenced a person’s ability to partake in a task, they include the difficulty of a task, the competition (rewards) and what he coined as entrepreneurship (Ziegler, Schmukle, Egloff and Buhner, 2010). These three main influences determined whether a person would take on a task (whether it be school work, a sporting activity or a work situation) and also determined how successful the person would be at completing this task.

This would, as Ziegler, Schmukle, Egloff and Buhner (2010) comment depends on the behaviour of the individual, whether their fear of failure/success indicators would move them to complete and succeed in completing the task. This theory was one of the main reasons that achievement motivation was developed, to determine how and why these variables influenced a person’s behaviour.
Achievement motivation is a type of motivation that is personal in nature. The basis of achievement motivation is achievement motive i.e. motive to achieve. Those who engage them in a task on account of an achievement motive are said to work under the spirit of achievement motivation. Murray (1938) conceived of personality as a series of primarily unconscious needs which involve “a readiness to respond” in certain ways under specific conditions. One of these 20 basic needs is the need for achievement.

The term was popularized in personality psychology by the TAT content analysis scoring system developed by McClelland, et.al. (1953) and Smith, (1992). Atkinson, (1964) investigated human motivation through the intensive study of a single motive known as the achievement motive. Atkinson, (1964) further stated that achievement motive applies when an individual realizes that his performance will be evaluated, according to some criteria his own or others, and that the resulting evaluation will be favorable (success) or unfavorable (failure).

The concept of achievement motivation was developed by McClelland et al., (1953) who refers to the motive as to achieve some standards of accomplishment or proficiency as reflected in competition set by one or others. He further believed that achievement motive is learned behaviour, which is associated with affective arousal and is a relatively stable personality characteristic and each individual constantly possesses a motive to achieve success though its degree varies from individual to individual.

**Heckhausen (1967)** defined achievement motivation as the striving to increase, or keep as high as possible, one's own capability of excellence in thought to apply and where the execution of such activities can, therefore, either succeed or fail.

**DeCecco (1970)** defined achievement motivation as expectancy of finding satisfaction in mastering challenging and different performances.

**According to International Encyclopedia of Social Sciences (1985)** "Achievement Motivation is an important determinant of aspiration, effort and persistence when an individual expects that his performance will be evaluated in relation to some standard of excellence. Such behaviour is called achievement oriented (Sills, 1972)."
Arnold, Eysenck, and Meili (1972) viewed achievement motivation as a construct designed to explain inter and intra individual differences in the orientations, intensity and consistency of achievement motivation.

Wolman, in Dictionary of Behavioural Sciences (1973) defined achievement motivation as a concern to improve, to do things better than one has done them before, to independently master objects and ideas and to increase self-esteem by successful exercise of talent.

Evans (1978) stated that most people feel some sense of urgency to strive for success in various aspects of their life, and this general push has been termed as achievement motive.

Achievement Motivation as the desire to accomplish difficult tasks and overcome obstacles and an individual is not so much concerned with success or failure in given task as with attaining a certain standard set for himself or herself.

First, Achievement Motivation involves an inclination on the part of the individual and how the personality influences a motivational state given the presence of certain environmental factors. Second, it involves a task oriented behaviour that can be evaluated. Third, the task orientation is related to some standard of excellence that may be either internally (by the person) or externally (by others) imposed. It plays an important role in individual and societal accomplishments.

Mehndirata (1997) has defined achievement motivation as the psychological need and energetic drive that prompts an individual to strive for and work towards mastering his or her environment by the successful accomplishment of a goal or goals accompanied by a sense of satisfaction and self-worth.

Colman (2001) has defined achievement motivation as a Social form of motivation involving a competitive drive to meet standards of excellence.

From the above definitions, it can be concluded that achievement motivation is a strong urge to excel. It refers to the behaviour of an individual who strives to accomplish something, to do his best, to excel others in performance. This involves competition with a particular standard of
excellence of performance. Achievement motivation is thus a learned motive to compete and to strive for success. Success becomes a goal, which must be achieved in one way or the other.

Achievement Motivation helps a student to develop thoughts and behaviour typical of learners high in Achievement motivation. Following activities are included in Achievement Motivation training to make better academic performance.

- Development of self-concept
- Realistic goal setting
- Achievement motivation thinking
- Personal responsibility training
- Development of concrete plans to accomplish goals
- Evaluation of goal progress

Thus, Achievement Motivation training is to be integrated with regular classroom content rather than include it as an activity with special content.

1.5.1 Need for Achievement Motivation

Need for Achievement (nAch) (McClelland, 1961; McClelland & Winter, 1969) is one of the psychological motives that play an important role in success and achievements of a man. Motivation as an academic engagement refers to “cognitive, emotional, and behavioral indicators of student investment in and attachment to education” (Tucker Zayco, & Herman, 2002, 477). Achievement motivation has been defined as the extent to which individuals differ in their need to strive to attain rewards, such as physical satisfaction, praise from others and feelings of personal mastery (McClelland, 1985). People with high achievement motives will act in ways that will help them to outperform others, meet or surpass some standard of excellence, or do something unique all students are influenced by a need to achieve to a certain degree. Those students, who hold a high desire of success, work hard to achieve (Zanobini & Usai, 2002).
The modern study of achievement motivation began with the work of David McClelland. He and his associates coined the term $n$ Ach denoting need for achievement (McClelland, 1961; McClelland & Winter, 1969). This theory says that under appropriate conditions, people will do what they have been rewarded for doing. Weiner (1986) has presented the most ambitious attribution theory of achievement motivation and emotions. This theory deals with the perceived causes of success and failure, the characteristics of causal thinking, and subsequent emotional experiences in relation to achievement behaviors.

Another important leap in motivational research is goal orientation theory. The basic premise of achievement goal orientation theory (Elliot and McGregor, 2001) is that when students engage in academic tasks, they set various personal goals and the types of goals that students adopt can directly influence their academic outcomes.

Elliot and McGregor’s (2001) model of achievement motivation, discuss two broad classes of goals: mastery goals i.e. to “master” the task at hand and performance goals i.e. demonstrating superior performance relative to others. Research indicates that when students adopt mastery goals, they tend to engage in more effective cognitive processing strategies (Noar, Anderman, Zimmerman, and Cupp, 2005). Social goals are another important type of goals, although not examined at length as mastery and performance goals (Dowson & Mcinerney, 2001).

In these goals social reasons are the main concerns for trying to achieve in academics. According to Maehr (2008) achievement motivation is largely social psychological in nature. It often occurs within groups, where interpersonal interactions can undermine or facilitate engagement in the tasks to be done.

Achievement motivation refers to the tendency to set and work hard to meet personal standards and to attain goals within one’s social environment (Ziegler, Schmukle, Egloff and Buhner, 2010). There are many facets of achievement motivation that different researchers have developed i.e. Goal theory, achievement behaviour theory and approach/avoidance motivation.
theory. These theories have all tried to answer questions, such as “What motives people to achieve, to seek success, to do well? The investigation of this question for many started with research into child development and what factors influenced a child’s ability to complete and achieve succeed at different tasks (McClelland, 1965).

This initial research highlighted three main areas of focus social influences (where children develop, what McClelland described as “achievement strivings”), cognitive influences (suggesting that some ways of thinking, such as perceptions of high ability, and high expectations influenced a child’s behaviour), and developmental influences (suggesting that achievement motivation is a struggle between approach and avoidance of achievement situations). (Hart, Stasson, Fulcher and Mahoney, 2008).

The research also highlighted what McClelland, among others found was that there was a struggle between wanting to succeed and the fear of failure. This struggle between attainment of success and avoidance of fear of failure influences whether someone will be oriented towards a high achieving behaviour or low achieving behaviour (Elliot and Church, 1997).

This struggle underlies two competence-relevant motives, the need for achievement and need to avoid failure (Elliot and Church, 1997). Elliot and Church, (1997) also point out that these motives can be considered non conscious and they are posited to energise, select and drive achievement motivation. It is this need for achievement motive that McClelland focused on and developed further.

McClelland (1965) summarised that need for Achievement (nAch) influenced behaviour, as it was a non conscious driver of achievement, similar to an individual’s need to eat (hunger) and to drink. He also predicted that achievement motives predicted long term behaviour trends (McClelland, 1965). McClelland (1965) further identified two major constructs within the need for achievement motive reflecting different aspects of achieving motives; they are implicit motives and self-attributed motives.
These two constructs have emerged from research on the need for achievement as research showed there were two main areas of focus. Motives based on imaginative through and those based on self-reported desires or interests. While initial research, such as Murray (1938) assumed that these two motives were part of the one motive type, further research conducted by McClelland and others has helped to identify these as two separate constructs can be measured, tested and assessed to determine a number of different things (Elliot and Church, 1997), such whether an individual suits a certain occupation or whether such things as gender influence a person’s ability to achieve.

Implicit and self-attributed motives, while both aspects of achievement motivation, as McClelland, Koestner and Weinberger, (1989) suggest that the two measures of achievement motives were uncorrelated and their behaviour correlates were different. They also further suggest that these two measures should be distinguished separately in future research. These researches lead McClelland to further develop the two constructs, explaining what aspects of achievement motivation they relate to and how to measure them.

Need for Achievement is related to the difficulty of tasks people choose to undertake. Those with low N-Ach may choose very easy tasks, in order to minimise risk of failure, or highly difficult tasks, such that a failure would not be embarrassing.

Those with high N-Ach tend to choose moderately difficult tasks, feeling that they are challenging, but within reach. People high in N-Ach are characterised by a tendency to seek challenges and a high degree of independence. Their most satisfying reward is the recognition of their achievements. Sources of high N-Ach include:

1. Parents who encouraged independence in childhood
2. Praise and rewards for success
3. Association of achievement with positive feelings
4. Association of achievement with one's own competence and effort, not luck
5. A desire to be effective or challenged
6. Intrapersonal Strength
7. Desirability
8. Feasibility
9. Goal Setting Abilities

1.5.2 High Achievement Motivation
- Children with High Achievement Motivation prefer moderately difficult tasks.
- Success is attainable yet attributable to their skill and effort.
- Pleasure in success
- Confident of abilities
- Experienced success
- Sets realistic goals

1.5.3 Low Achievement Motivation
- Children who have Low Achievement Motivation prefer very easy or very difficult tasks.
- Motivating force is fear of failure
- Long history of experiencing failure
- Afraid of ridicule and disappointment
- Not blame him if he fails.
- Didn’t expect him to succeed.

1.5.4 Characteristics of Achievement Motivation
Psychologists have discovered some general traits of the high n-Ach individual.

1. The Achievement Motive originates in the early childhood, as do most of the other learned motives. The strength of achievement motive measured in childhood correlates with its measured strength when the children become adults.

2. People who score high on achievement motivation prefer and work hardest under conditions of moderate and realistic risk, especially when they have some control over results.

3. Individuals with higher achievement motivation do better on all sorts of tasks, particularly of tasks which permit learning demand concentration, or contain levels of difficulty which by mastering one’s competence can be demonstrated.
4. The achievement oriented individual is restless and innovative. He seeks and uses new information, advice from experts, and feedback about their previous performance.

5. They prefer to keep eyes on a big goal, they prefer tasks that extend over longer period of time, need to be planned and require decisions. They do not need success to occur soon, rather they are able to wait.

6. Achievement oriented individual is better able to postpone gratification and when a choice is given between an immediate small reward and a future larger one, they frequently decide in favour of larger one.

7. Highly motivated persons throughout have a higher occupational level of aspiration, the demands for one's best performance are more decisive than the mere prestige of an occupation.

8. Highly motivated individuals have more tolerance than the individuals with low motivation for longer delay of rewards.

9. They bargain rationally and cooperatively and get along well with other people. Nevertheless, they are proved to cheat and use illegal (or even revolutionary) tactics when necessary.

10. Achievement-oriented persons tended to choose as a work partner a person who is good at performing the task to be done rather than the persons they like. The highly achievement motivated individual may feel frustrated when assigned to a work group; unless it happens that the group includes other person’s who are similarly motivated and competent.

11. Highly achievement motivated individuals work for a much longer time and decline help or rest periods offered than individual with low achievement motivation do on a complex task in which feedback about the accuracy of the proposed solutions is absent; they also, perform better regardless of the time taken for the task.

12. Highly achievement motivated individuals are unable to quit the tasks after experience of serious failure even though they are capable only of feeble, sporadic, and cramped efforts, and though the embarrassed behaviour typical of conflict became predominant. They are not able to leave the task even though they are no longer working on it.
1.5.5 Dimensions of Achievement Motivation

- **Compensatory Effort**: A willingness to expend extra effort in order to avoid failing at a work task, even if this effort results in over-preparation. A constructive reaction to the possibility of failure. Individuals who score high on this scale will compensate for a fear of failing at a difficult task by better preparing for the task. In the workplace, these individuals can be expected to be better prepared (or even over-prepared) than others. Especially relevant in case of low Fearlessness.

- **Competitiveness**: Motivation derived from competing with others. A desire to win and be better and faster than others. People who score high on this dimension love to compete with others and compare their accomplishments to others'. Winning motivates these individuals to expend even more effort.

- **Confidence in Success**: Confidence in achieving success even when there are obstacles to overcome. People who score high on this dimension anticipate that their efforts will lead to success. These individuals are confident in achieving their goals even when facing new and difficult tasks. Their confidence stems from a faith in their knowledge, skills, and abilities as opposed to a belief in luck or fate.

- **Dominance**: The tendency to exercise power and influence over others. People who score high on this dimension are likely to take initiative and to seek control over activities. They would likely play a dominant role in influencing the results of a team and in taking a leadership role.

- **Eagerness to Learn**: The desire and willingness to spend a lot of time enlarging one's knowledge for knowledge sake. People who score high on this dimension have a thirst for knowledge and will strive to learn new things, even in the absence of any external rewards.

- **Engagement**: The desire to be regularly engaged in an activity, usually work related. People who are highly engaged place a high priority on work and are uncomfortable when they have nothing to do. They are able to maintain a high activity level for a long period, with little rest. In the
extreme, people high on this dimension may be “workaholics,” neglecting aspects of their personal life.

- **Fearlessness:** A lack of fear of failing at difficult tasks. People who score high on this dimension are not nervous about performing in public or under time-pressure. They do not fear being judged by others and do not become overly anxious when faced with important tasks. These individuals could be characterized as emotionally stable—minor setbacks will not have lasting effects.

- **Flexibility:** A willingness to accept changes and the enjoyment of challenging new tasks. People who score high on this dimension tend to be open-minded and interested in many things. They can easily adapt to new work situations and exhibit a readiness for change. New situations and things are appealing, especially if these experiences are likely to increase their knowledge.

- **Flow:** The ability to concentrate on something for a long time without being distracted by situational influences. People who score high on this dimension tend to become lost to the outside world when they are absorbed in a task. They are extremely persevering and in the extreme can be over-preoccupied.

- **Goal Setting:** The tendency to set goals and to make long term plans for achieving these goals. People who score high on this dimension are future-oriented and have high standards for what they want to achieve.

- **Independence:** The tendency to take responsibility for one's own actions. People who score high on this dimension would rather make their own decisions and work at their own pace than take direction from others.

- **Internality:** The belief that one's successes are due to internal causes rather than to situational variables. People who score high on this dimension are likely to attribute the consequences of their behaviors to internal causes. They believe that outcomes are the direct result of one's own actions and effort.
• **Persistence**: The willingness to exert large amounts of effort over long periods in order to reach a goal. Individuals who score high on this dimension are able to concentrate fully on the task at hand without being distracted. These individuals could be described as tenacious or energetic in striving to complete a task.

• **Preference for Difficult Tasks**: The tendency to seek out challenging rather than easy tasks, and the desire to seek greater challenges once one has already completed a difficult task. People who score high on this dimension prefer to take on difficult tasks with a high risk of failure to easy tasks with a low risk of failure.

• **Pride in Productivity**: A sense of enjoyment and accomplishment derived from doing one's best at work. People who score high on this dimension are most satisfied when they feel they have improved their performance. Their self-esteem is dependent upon achievement and they gain positive emotions arising from good performance.

• **Self-Control**: The ability to delay gratification and to organize oneself and one's work. People who score high on this dimension are able to make long term-plans. They do not procrastinate and concentrate on their work with a great deal of self-discipline.

• **Status Orientation**: The desire to attain high status in one's personal life and to progress professionally. People who score high on this dimension endeavor to achieve an important position in life and to be admired for their achievements. They are especially motivated to pursue an important career and to progress in their jobs.

Earlier work of psychologists on achievement motivation was too un dimensional and maintained that the need was a single need or general personality trait where as Spence and Helmreich (1983) presented three-factor model of achievement motivation and consider that it is best conceptualized in terms of three dimensions: work orientation, mastery and competitiveness. They developed Work and Family Orientation Questionnaire (WOFO) to measure these factors.
• **Work Orientation.** It refers to the amount of effort one is willing to put in on a task to do a good job.

• **Mastery:** This factor reflects a preference for an internally prescribed standard of performance and for difficult challenging task.

• **Competitiveness:** This dimension describes the enjoyment in interpersonal striving, such as desire to be "number one". Like Murray had in 1930's Spence and Helm Reich reflected the mindset of many psychologists is suggesting that achievement should be considered in terms of general personality traits.

  Though, achievement motivation is developed in childhood, yet it can be developed in later years or can be increased through various programmes. n-Ach training has been introduced into school with some success.

  The activities are deliberately designed to encourage students to improve on their past records, take risks, find unique solutions to difficult problems, take responsibility for their own performance, excel in competition and plan their goals.

  The level of achievement motivation can be increased in an organization where (1) goal setting behaviour is encouraged (2) personal responsibility for task accomplishment is demanded (3) performance feedback is given to worker (4) workers are allowed to make moderate risks and (5) rewards are given according to their performance.

1.6 **ACHIEVEMENT**

  Achievement encompasses student's ability and performance, it is multidimensional, intricately related to human growth and cognitive, emotional, social and physical development, it reflect the whole child, it is not related to a single instance, but occurs across time and levels, through students life in public school and on post secondary years and working life.

  The word Achievement is a wider term. It includes many dimensions of accomplishment in a given area as well as in different areas in terms of speed, accuracy, quality and levels of difficulty with which an individual can perform tasks to present achievement. So Achievement is the proficiency, accomplishment or performance in a given skill or body of knowledge.
Achievement is of paramount importance particularly in the present socio-economic and cultural context. Obviously in the society great emphasis is placed on achievement right from the beginning of formal education. The school has its own systematic hierarchy which is largely based on achievement and performance rather than on aspiration or quality. Thus, the school tends to emphasize achievement, which facilitates to achieve the goal of life.

Achievement has been considered as an important factor in the educational life of the students. It encourages the students to work hard and learn more. It is the status or levels of a person's learning and his ability to apply what he has learned. Achievement would not only include acquisition of knowledge and skills but also attitudes and values. (Pressey and Robinson, and Horracks 1959)

In new Webster's Dictionary and Thesaurus (1992), it is stated that achievement means to bring to a successful end or a performance.

Generally Achievement, in general, refers to the scores obtained in the annual examination or refers to the degree or level of success or proficiency attained in some specific area, concerning scholastic or academic work. Academic or educational age, accomplishment quotient or achievement quotient are the most commonly used means to interpret the level of Academic Achievement of pupils in general or in a specific given subject matter.

Achievement of the pupils continues to be the primary concern in education and main area of educational research. The study of Students Achievement and its factors had claimed the attention of researchers even before 1930, by which years of number of studies had been reported. They were reviewed by Harries (1931). In the year between 1930 and 1937, greater research enthusiasm was shown in this area and Harries (1940) published other 328 studies during this period.

Achievement is one part of the wider term educational growth plays an important role in the life of child. It refers to what a student has achieved in different subjects of studies during the course of academic year. Achievement has largely to do with the intra-individual differences as with inter-individual
differences i.e. between one individual and another, between one group and another group besides area of functioning of an individual of the same group, same grade and same potential ability differing in the academic proficiency due to many factors. High Achievement in school builds self-esteem and self-confidence which leads to better adjustment with the group. Achievement encompasses enhancement, self-actualization. Self-improvement and some form of competitiveness (Maslow, 1954).

In view of Good (1959) and Biswas and Aggrawal (1971) there seems to be considerable similarities in as much as all of them place emphasis on knowledge attained or skills developed in the academic subjects usually designated by test scores. It is different from proficiency in the area of different arts or physical skills. Academic or educational age, accomplishment-quotient or achievement-quotient are the most commonly used means to interpret the level of Achievement of pupils in general or in specific subject matter.

Trow (1960) defines Achievement as the attained ability or degree of competence in schools task usually measured by standardised tests and expressed in grades or units based on norms, derived from a wider sampling of pupils’ performance.

According to Crow and Crow (1969) Achievement means the extent to which a learner is profiting from instructions in given area of learning. In other words, achievement is reflected by the extent to which skills or a person from the training imparted to him has acquired knowledge; it is the outcome of general and specific learning experience.

Mehta (1969) expressed the view that the word performance is a wider term, which includes both the academic and co-curricular performance of an individual. Achievement is the learning outcome of a student. A level of Students’ Achievement in academic field of a student is included in the performance of an individual.

Good (1973) in the Dictionary of Education refers to Achievement as the knowledge attained or skill developed in the school subjects, usually designated by test scores or marks assigned by the teacher.
According to Torrance (1973) the term Achievement refers to any desirable learning that occurs, whether it is considered as desirable or not. Hence any behaviour that is learned may come within a definition of achievement.

According to Kohli (1975) Achievement of Students is the level of proficiency attained in academic work or as formally acquired knowledge in the School subjects, which is often represented by percentage of mark obtained by students in examination.

Achievement refers to pupil's knowledge, attainment and skill developed in the school subjects, which are assessed by the authorities with the help of achievement test, in the form of examination and generally indicated by the test scores or by marks assigned by the teacher or both.

Achievement indicates the learning outcome of students. As a result of learning different subjects, the behaviour pattern of the student’s changes. Learning affects three major areas of behaviour of students (i) cognitive (intellectual development, recall and recognition), (ii) affective (self-concept and personal growth), and (iii) psychomotor (developing of muscular skills). Thus, achievement refers to knowledge and skills gained from experience, and achieved level of expertise or performance in a specific domain.

Achievement means successful accomplishment or performance in particular subjects areas or courses usually by reasons of skill, hard work, interest, and typically summarized in various types of grades, marks, scores or descriptive commentary.

According to Concise Dictionary or education by Hawes and Hawes (1982), the word academic refers to the institutional system or formal education within a school, college or university; theoretical and not of practical importance; a scholarly person who works in higher education.

According to Taneja’s Dictionary of Education (1989), Achievement of Pupils refer to performance in school or college in standardized series of educational tests.
According to Random House Webster's College Thesaurus (1997) Academic Achievement means those qualities or attributes or characteristics or traits of an individual which contribute to or have a direct bearing or effect or influence on accomplishment or proficiency or performance pertaining to any activity scholastic in nature or any scholarly activity (Jess, Stuart, Fraser 1997)

According to Ladson (1999) Achievement represents intellectual growth and the ability to participate in the production of knowledge. At its worst, Academic Achievement represents inculcation and mindless introduction of the young into the cannons and orthodoxy of the old.

According to Oxford Advanced Learner's Dictionary (2000), Achievement is a thing that somebody has done successfully; especially using his/ her own effort and skill.

From the definitions given above, it may be concluded that Achievement of Students is the core of wider term educational growth and perhaps none would deny the importance of Achievement in child's life. Achievement in the school may be taken to mean any desirable learning that is observed in the students. Since the word desirable implies a value judgment, it is obvious that a particular piece of learning may be referred to as achievement or otherwise depending on whether it is considered desirable or not. Achievement is used in this broad sense. It is customary for schools and colleges to be concerned to a greater extent with the development of knowledge, understanding and acquisition of skills.

In short, Achievement refers to the degree or level of success or that of proficiency attained in some specific area concerning scholastic or academic work. In general, it refers to the scores obtained in the annual examination. It is measured and assessed by the achievement test and compared to the set norms to evaluate individual performance.
1.6.1 Present System of Assessing Achievement of Students

Assessment is a form of communication and is seen as an integral part of learning and teaching. Assessment can be diagnostic, formative and summative. Assessment for Student’s Achievement can be recognised as central to classroom practice. Teachers need to be sensitive and empathetic as all assessments have an emotional impact and can contribute to students’ motivation. The overall goal of assessment is to improve student learning. Assessment provides students, parents and teachers with valid information concerning student progress. Assessment requires the gathering of evidence of student performance over a period of time to measure learning and understanding.

The Present System of Assessment emphasises on Continuous and Comprehensive Evaluation of the Students. Continuous and Comprehensive Evaluation (CCE) refers to a system of school based evaluation of a student that covers all aspects of a student development. It is a developmental process of student which emphasizes on two fold objectives. These objectives are continuity in evaluation and assessment of broad based learning and behavioural outcomes on the other.

The term ‘continuous’ is meant to emphasise that evaluation of identified aspects of students ‘growth and development’ is a continuous process rather than an event, built into the total teaching-learning process and spread over the entire span of academic session. It means regularity of assessment, frequency of unit testing, diagnosis of learning gaps, use of corrective measures, retesting and feedback of evidence to teachers and students for their self evaluation.

The second term ‘comprehensive’ means that the scheme attempts to cover both the scholastic and the co-scholastic aspects of the students’ growth and development.

Since abilities, attitudes and aptitudes can manifest themselves in forms other than the written word, the term refers to application of variety of tools and techniques (both testing and non-testing) and aims at assessing a student’s development in areas of learning, like:-
1.6.2 **Scholastic and Co-Scholastic Assessment of Achievement**

In order to have Continuous and Comprehensive Evaluation, both Scholastic and Co-Scholastic aspects need to be given due recognition. Such a holistic assessment requires maintaining an ongoing and comprehensive profile for each learner that is honest, encouraging and discreet.

While teachers frequently reflect, plan and implement remedial strategies, the child’s ability to retain and articulate what has been learned over a period of time also requires periodic assessment.

These assessments can take many forms but all of them should be as comprehensive and discreet as possible. Weekly, fortnightly, or quarterly reviews (depending on the learning area), that do not openly compare one learner with another are generally recommended. The objective is to promote and enhance not just learning and retention among children, but their soft skills as well.

**a) Scholastic Assessment of Students Achievement:**

The objectives of the Scholastic domain are:-

i) Desirable behaviour related to the learner’s knowledge, understanding, application, evaluation, analysis and the ability to apply it in an unfamiliar situation.

ii) To improve the teaching learning process.

iii) Assessment should be both Formative and Summative.

The Techniques of Scholastic Assessment of Students Achievement well depicted by Table No. 1.4
### Techniques of Scholastic Assessment of Students Achievement

#### Formative Assessment (Flexible Timing)

<table>
<thead>
<tr>
<th>Tools</th>
<th>Techniques</th>
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<tr>
<td>Questions</td>
<td>Examination</td>
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<tr>
<td>Observation schedule</td>
<td>Assignments</td>
</tr>
<tr>
<td>Interview schedule</td>
<td>Quizzes and competitions</td>
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<tr>
<td>Checklist</td>
<td>Projects</td>
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<tr>
<td>Rating scale</td>
<td>Debates</td>
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<tr>
<td>Anecdotal records</td>
<td>Eloquence</td>
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<tr>
<td>Document analysis</td>
<td>Group discussions</td>
</tr>
<tr>
<td>Tests and inventories</td>
<td>Club activities</td>
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<tr>
<td>Portfolio analysis</td>
<td>Experiments</td>
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<td></td>
<td>Research</td>
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</tbody>
</table>

#### Summative Assessment (Written, End of Term)

- Objective type
- Short answer
- Long answer

### b) Co-Scholastic Assessment of Students Achievement

The desirable behaviour related to learner’s life skills, attitudes, interests, values, co-curricular activities and physical health are described as skills to be acquired in co-scholastic domain.

The process of assessing the students’ progress in achieving objectives related to scholastic and co-scholastic domain is called comprehensive evaluation. It has been observed that usually under the scholastic domain such as knowledge and understanding of the facts, concepts, principles etc. of a subject are assessed.

The Co-Scholastic elements are either altogether excluded from the evaluation process or they are not given adequate attention. For making the evaluation comprehensive, both Scholastic and Co-Scholastic aspects should be given importance. Simple and manageable means of assessment of Co-Scholastic aspects of growth must be included in the comprehensive evaluation scheme. The Techniques of Assessment of Co-Scholastic Area of Students Achievement is described by Figure 1.5
Techniques of Assessment of Co-Scholastic Area of Students Achievement

Figure - 1.5

Comprehensive evaluation would necessitate the use of a variety of tools and techniques. This will be so because both different and specific areas of learner’s growth can be evaluated through certain special techniques.
1.6.3 Factors Affecting Achievement of Students

Achievement is a multidimensional and multifaceted phenomenon. There are innumerable factors, which affect performance of students and also responsible for high and low achievements. These have been classified into the following categories of their sources:

- **Cognitive Factors**: Intelligence, Creativity, Ability, Reasoning Ability, Problem Solving, Learning Rate etc.

- **Affective Factors**: Cognitive Style, Motivation, Anxiety, Study Habits, Values, Interests, Self-efficacy, Perseverance, Stress, Level of Aspiration, self-concept, Emotional Maturity, Achievement Motivation, Attitudes, Adjustment, Needs, Curiosity etc.

- **School Related Factors**: Type of School, School Climate, Teachers’ Personality, Home Work, Alienation, Teachers’ Expectation and Attitude, Training Strategies, Teachers’ Experience, Medium of Instructions, Teachers’ Behaviour and Competency, Class Room Environment etc.

- **Home Related Factors**: Socio-Economic Status, Family Size, Birth Order, Gender Bias, Parental Involvement, Parental Expectation and working Status of Parents, Deprivation, Parental Support, Child Rearing Practices, Parental Aptitude and Expectations etc.

- **Time factors**: Time Spent, Time Required, Time Allowed etc.

- **Miscellaneous factors**: Culture, Locality, Age, Gender, Caste, Friends etc.

These factors affect the Academic Achievement both positively as well as adversely.

1.7 Emergence of the Problem

For the present investigation variables of Modular and Multimedia Instructional Strategies, Cognitive Styles and Achievement Motivation have been selected to study their effect on Achievement of Secondary School students studying through Central Board of Secondary Education (C.B.S.E.), on the basis of considerations Research studies of Donald and William (1973), Puttorak (1975), Heller and Date (1976), Sahajahan, (1980), Kaur, (1981), Passi and Pal (1982), Hopper, (1982), Sharma, (1982), Khanna (1983),

However researches conducted by Kathuria (1984), Thompson, (1997), Dubey and Khuntia (2000), Culbertson et al. (2004), could not find any significant relationship of Modular Instructional Strategy on Achievement.

In addition, one study by Dhamija (1985) concluded that the involvement of students in classroom was maximum when they were taught through the radio-vision approach and self-confidence among the students increased the most when they were taught through the modular approach.


In controvertion results of the studies conducted by Kumar and Sudeesh (1998), Altun and Cakan (2006) and Ipek (2010) did not find significant effect of Cognitive Styles on Achievement.


However, researchers like Biggs (1989), Sharma (2006), Bhatt (2009), Study by Reynolds and Weigand (2010) and Onete (2012) could not find significant effect of Achievement Motivation on Students’ Achievement.
In addition, there are studies by Kaul & Bhadwal (1989) which examined same level of achievement motivation at the end of instruction and Riley & Shannon (2002) studied mediated relationship between the Achievement Motivation and Achievement.

Survey of the related literature, on the studies conducted in this field, does not lead to a clear-cut trend. The results of these studies present various types of relationships of these variables with Achievement. These studies showed the effect of variables of Modular and Multimedia Instructional Strategies, Cognitive Styles and Achievement Motivation taken up singly on Achievement, but the conjoint effect of all the variables on Achievement may present a different picture.

The variable-wise rationale of the problem leaves wide scope for investigating the combined impact of independent variables on dependent variable in different combinations in a factorial frame of reference. It may be concluded that the variables of Modular and Multimedia Instructional Strategies, Cognitive Styles and Achievement Motivation are interrelated factors and if investigated together in the light of Achievement of students, the study may throw better light on the individual and combined impact of these variables which may be used effectively for the educational significance by its users.

1.8 STATEMENT OF THE PROBLEM:
EFFECT OF MODULAR AND MULTIMEDIA INSTRUCTIONAL STRATEGIES ON ACHIEVEMENT IN RELATION TO COGNITIVE STYLES AND ACHIEVEMENT MOTIVATION AT THE SECONDARY STAGE

1.9 Objectives of the Study
The following are the objectives of the Study:-

1. To find out the differences on Achievement of Field Independent and Field Dependent groups of students at the Secondary Stage.
2. To study the differences on Achievement of High and Low Achievement Motivation groups of students at the Secondary Stage.
3. To work out differences on Achievement of students taught through Modular and Multimedia Instructional Strategies and that of the Control group of students at the Secondary Stage.

4. To work out the interaction effect of the variables of Cognitive Styles and Achievement Motivation on Achievement of students at the Secondary Stage.

5. To study the interaction effect of the variables of Cognitive Styles and Instructional Strategies on Achievement of students at the Secondary Stage.

6. To find out the interaction effect of Achievement Motivation and Instructional Strategies on Achievement of students at the Secondary Stage.

7. To study the interaction effect of the variables of Cognitive Styles, Achievement Motivation, and Instructional Strategies on Achievement of students at the Secondary Stage.

8. To work out the intercorrelations among the variables of Cognitive Styles, Achievement Motivation, Instructional Strategies and Achievement of the Secondary Stage students.

1.9 Hypotheses of the Study

The following are the Hypotheses of the Study:-

1. The Field Independent group of students will be significantly higher than that of the Field Dependent group of students in Achievement.

2. The students with High Achievement Motivation will be significantly higher in Achievement than that of the students with Low Achievement Motivation.

3. There will be no significant differences in the Achievement of students taught through Modular and Multimedia Instructional Strategies and that of the Control Group of students.

4. The interaction effect of the variables of Cognitive Styles and Achievement Motivation will yield significant results on Achievement.

5. The interaction effect of Cognitive Styles and Instructional Strategies on Achievement will be significant.
6. The interaction effect of Achievement Motivation and Instructional Strategies on Achievement will be significant.
7. There will be no significant interaction effect of the variables of Cognitive Styles, Achievement Motivation and Instructional Strategies on Achievement.
8. The intercorrelations among the variables of Cognitive Styles, Achievement Motivation, Instructional Strategies and Achievement will be positive and significant.

1.10 Delimitation of the Study

The present study was delimited with respect to the variables of the study, sample, tools and techniques.
1. The present study was confined to class IX students only.
2. The present study was delimited to a sample of 500 students studying in C.B.S.E. affiliated schools of Chandigarh.
3. The study was restricted only to three levels of Instructional Strategies and two levels of each of the independent variables of Cognitive Styles and Achievement Motivation given below:
   a) Instructional Strategies. (I)
      * Modular Instructional Strategies (I1)
      * Multimedia Instructional Strategies (I2)
      * Control Group (No Teaching) (I0)
   b) Cognitive Styles (C)
      * Field Independent (C1)
      * Field Dependent (C2)
   c) Achievement Motivation
      * High Achievement Motivation (A1)
      * Low Achievement Motivation (A2)
4. This study was delimited to urban area schools only.
5. The Instructional Strategies (Modular Multimedia) were developed only on topics of English Grammar from the prescribed syllabus N.C.E.R.T. Text Books at Secondary Stage.