WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC and to secure to all its citizens:

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity;

and to promote among them all

FRATERNITY assuring the dignity of the individual and the unity and integrity of the Nation;

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949, do HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.
INTRODUCING EDUCATION

Class XII
(New Syllabus)

By
Ms. Sunita Sen, M.A., M.Ed., PGDCA
Principal, Ballygunge Shiksha Sadan
Kolkata

West Bengal Council of Higher Secondary Education
VIDYASAGAR BHAVAN
SALT LAKE, KOLKATA 700 091
COPYRIGHT

WEST BENGAL COUNCIL OF HIGHER SECONDARY EDUCATION

No portion of this book can be reproduced/printed/scanned in any form/font/script/translation without prior written permission from Deputy Secretary (Academic) of West Bengal Council of Higher Secondary Education.

First Edition : May, 2014

Published by : West Bengal Council of Higher Secondary Education

Printed and Distributed By :

Price : One hundred twenty five only.
As per recommendations of State Government Expert Committee on School Education and the Board of Studies in education of the Council and the subsequent approval of the School Education Department, the text book on Education Syllabi XII for the session 2014-2015 is being published. We hope the students with a variegated flavor of Education with the help of their teachers will have an overview of Education. In the classroom teaching-learning process, the teacher should act as facilitators; they should read the text with the students and help them to understand, to exploit the materials so that they can have a comprehensive and in-depth knowledge of the subject. I feel deeply indebted to the author for her sincere endeavour to publish the work by putting together her knowledge in the sphere of Education. At the same time my sincere thanks to the management, teachers, staffs and students of her present institution for giving her the freedom to try her hands in multifarious activities, thus serving the society at large. Finally, I am also extremely grateful to the Institute of Educational Research and Evaluation for looking after the production of the book and enabling us to publish the book in record time.

My best wishes both for the teachers and my dear learners.

Dr. Mahua Das
President
West Bengal Council of Higher Secondary Education
Vidyasagar Bhavan
1. Learning
   a) Learning—definition and nature, types (as stated by Gagne)
   b) Factors of Learning
      i) Maturation—Its role in learning
      ii) Motivation—Definition, Role in Learning
      iii) Attention—Definition, Characteristics, Role in Education
      iv) Interest—Definition, Characteristics, Role in Education
      v) Mental Abilities—Nature as described by Spearman and Thurston
         ● Intelligence—Definition and Characteristics
         ● Role of mental abilities in learning

2. Mechanisms of learning
   a) Conditioning
      i) Classical conditioning—experiment and educational implications
      ii) Operant conditioning—experiment and educational implications
   b) Problem Solving
      i) Trial and error mechanism—experiment, major laws, educational implications
      ii) Insightful mechanism—experiment and educational implications

3. Statistics in education
   i) Tabulation of data
   ii) Frequency distribution
   iii) Graphical representation (frequency Polygon and Histogram)
   iv) Measures of central tendency and their uses

GROUP: B (30 Marks)

Historical Development (Post-independent period)

4. Educational provisions in Indian constitution related to women’s education, equal-ization of opportunity, education for minority, SC, ST

5. University Education Commission (1948-49) — First Education Commission in free India, Aims of higher education and concept of Rural University

7. The Indian Education Commission or Kothari Commission (1964-66) and the modern system of education in India

a) concept of general education in present India
   - Stages of General education in present India
     i) Pre-Primary education—Aims and objectives, structure, curriculum and institutions
     ii) Primary education—Aims and objectives, structure, curriculum and institutions
     iii) Secondary education—Aims and objectives, structure, curriculum and institutions
     iv) Higher Secondary—Aims and objectives, structure, curriculum and institutions
     v) Higher education—mention the position of higher education according to Kothari commission

b) Vocational and Technical education prevailing in India
   i) Vocational and Technical education—concept, relation, types of institutions up to secondary level
   ii) Vocational and Technical education—types, curriculum and institutions up to higher secondary level

c) Opportunities of education after higher secondary stage (names of courses)

   GROUP : C (10 Marks)
   (Current Issues in Indian education)

9. Education for the differently abled children
   i) Visually impaired children—Categories and educational provisions
   ii) Deaf and dumb children—Categories and educational provisions
   iii) Common behavioural problems observed in class room situations and the role of the Parents and teachers to overcome these problems (general study)

10. Universalization of primary education (U.P.E.)
    i) Concept
    ii) Measures taken to achieve the objectives of U.P.E—Audit Education programme. Literacy drive programme, S.S.A.

   GROUP : D (10 Marks)
   (Education for the 21st century)

12. Role of Technology in education

**PROJECT WORK (20 MARKS)**

- Study of interest pattern amongst secondary/higher secondary students.
- To study the achievement of students at secondary level in any two subjects and analyse scores in terms of mean, median & mode.
- To study the behavioural problems observed amongst the adolescents in a school and suggest measures to overcome it.
- To study the programmes or activities of S.S.A. in your locality.
- To study the curriculum and types of primary schools (at least two in and around your locality). A part from the suggested projet or field studies any relevant project based or the syllabus can be undertaken.
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Learning</td>
<td>3 - 38</td>
</tr>
<tr>
<td>2</td>
<td>Mechanism of Learning</td>
<td>39 - 50</td>
</tr>
<tr>
<td>3</td>
<td>Statistics in Education</td>
<td>51 - 101</td>
</tr>
<tr>
<td>4</td>
<td>Educational Provisions in the Indian Constitution</td>
<td>105 - 118</td>
</tr>
<tr>
<td>5</td>
<td>University Education Commission (1948-49)</td>
<td>119 - 128</td>
</tr>
<tr>
<td>7</td>
<td>The Indian Education Commission or Kothari Commission (1964 - 66)</td>
<td>137 - 153</td>
</tr>
<tr>
<td>8</td>
<td>N.E.P. (1986 as reviewed in 1992) Basic Features</td>
<td>154 - 177</td>
</tr>
<tr>
<td>9</td>
<td>Education for Differently Abled Children</td>
<td>181 - 191</td>
</tr>
<tr>
<td>10</td>
<td>Universalisation of Primary Education (U.P.E.)</td>
<td>192 - 195</td>
</tr>
<tr>
<td>11</td>
<td>Global Vision for Education</td>
<td>199 - 200</td>
</tr>
<tr>
<td>12</td>
<td>Role of Technology in Education</td>
<td>201 - 213</td>
</tr>
</tbody>
</table>
GROUP - A

PSYCHOLOGICAL AND STATISTICAL PERSPECTIVE
INTRODUCING EDUCATION
LEARNING

MEANING AND DEFINITION OF LEARNING

Learning means to bring changes in the behavior of the organism. It is very difficult to give a universally acceptable definition of learning because various theories developed by psychologists attempt to define the term from different angles. Learning in psychology has the status of a construct. Construct means an idea or image that cannot be directly observed like electrons of genes but which is inferred from the behavior of the organism. Melvin H. Marx defines learning as “Learning is a relatively enduring change in behavior which is a function of prior behavior (usually called practice).”

The definition given above emphasizes four attributes of learning as a process—the first is that learning is a permanent change in behavior. It does not include change due to illness, fatigue, maturation and use of intoxicants. The second is that learning is not directly observable but manifests in that it results in some change of enduring nature. The third attribute of learning is that it results in some change of enduring nature. The fourth and the last is that learning depends on practice and experience. Hilgard defined learning as, ‘a change in a subject’s behavior to a given situation brought about his repeated experiences in that situation, provided that the behavior change cannot be explained on the basis of native response tendencies, maturation, or temporary states of the subject (e.g. fatigue, drugs, etc.)

Let us illustrate learning process with the help of a concrete example. Suppose there are three children in a class from three different religions, one is from an orthodox Hindu family, second is from a Muslim family and the third one is from a Sikh family. They greet the teacher in three different ways one by “folding his hands” another by “salam sahib” and the third by “sat sri akal” “You see, why is it so? It is the result of their early training and experiences in home. The early training has brought a permanent change in their behavior. This type of change can be termed as learning.

There are certain terms which are confused with learning such as instincts, imprinting and maturation. If we examine the behavior of an organism we find that some behavior of the organism is reflexive or inborn as for example we breathe, our heart pumps, our cells apparently team with activity, our knee jerks etc. All these activities take place without the benefit of learning. As we move to lower animals, reflexes and instincts account more and more for their behavior. An instinct according to R. Haber 1966 is “A pattern of behavior, usually complex in nature which is found universally among the members of a species,
occurs without the need for prior learning or experience, as relatively invariant in form, and is reliably elicited or released by a particular and usually very simple stimulus.”

**Imprinting.**

Another term which is confused with learning is imprinting. At a certain crucial time, sometime after emerging from their cells, a new born duckling can be induced to waddle after anything from a football to an experimenter that is moving near by. This is accomplished by simply exposing the duckling to a moving object. If the timing is right then they will continue to follow these objects. This behavior is called imprinting. It is not learnt, but rather a kind of instinctive reaction that capitalizes on a tendency which appears when the time is ripe. It is the following behavior that is inborn not the choice of what is followed.

---

**TYPES OF LEARNING**

Learning has been classified in various categories as learning of motor skills such as walking, writing, swimming, typing etc, which require the use of motor skills and verbal learning involving verbal expression. Affective learning and cognitive learning emphasize the role of learning emotional responses and learning of fact, understanding of facts and problem-solving. It is very difficult to dichotomize learning into clear cut categories because one category overlaps the other. **Gagne has classified learning into eight types in a hierarchical order as given below:**

2. S-R learning.
3. Chain learning.
5. Multiple discrimination.
7. Learning of principles.
8. Problem-solving

**(1) Signal Learning**

Signal learning is commonly termed as **classical conditioning.** Classical conditioning was developed by Russian Physiologist Pavlov. In classical conditioning, unconditioned stimulus (food) and conditioned stimulus (sound of the bell) are paired together and presented to the dog a number of times with the result that when CS (sound of the bell) is presented alone, it elicits the saliva. This modification of behavior, causing salivation to the sound of the bell, is called conditioning.
(2) **Stimulus-Response Learning : Operant Conditioning (Learning Type-2)**

The study of operant or instrumental conditioning started from the puzzle box experiments on cats by Thorndike. He placed a hungry cat in a box and a dish of food outside the box. The cat in order to come out of the box had to manipulate a lever within the box. The manipulation of lever is a response that is instrumental in producing the reward, escape and food and for this reason this type of learning is called, instrumental conditioning. Instrumental (operant) conditioning is more flexible than classical conditioning because the responses that may be conditioned are not confined to natural or innate responses but to a variety of responses. In instrumental conditioning the experimenter waits for the subject to emit a response that approximates the one he wishes to establish and then reinforces it. B.F. Skinner conducted series of experiments on animals and prepared ground for the use of the principles in human learning.

(3) **Chain Learning**

There are mainly two types of chaining: motor and verbal. Chaining means the connection of a set of individual S-R in sequence- There are sequences that are made up of motor responses like that of turning on a TV set or washing machine. There are sequences which are entirely verbal as greeting.

(a) **Verbal chaining.** It is a matter of connecting together in a sequence two or more previously learning stimulus response (S,s-R’s). Our language is filled with such chains of verbal sequence as horse and buggy, boy meets girl and daddy and mummy are the examples of verbal chaining. In these examples the first member of the sequence seems firmly tied to the second.

(b) **Motor chaining.** The example of motor chaining can be given by a simple task of driving. The task of driving a motor consists of several learning chains of motor activities. Guthrie in 1935 described a case of motor chaining:

A college girl developed the habit of dropping her coat on the floor. Mother asked the girl to get out of the room and hang up the coat on the peg. The girl enters her house - keeps coats on, approaches closet-hangs up the coat on the peg.

Another example of motor changing is unlocking a door by a child who has not learned the sequence of unlocking operations. The following stimulus response connections from the process of unlocking door are given:

1. Key in hand, 2. facing the lock, 3. checking the key is right side up, 4. inserting it into the lock until the stop is reached, 5. turns it until another stop is reached, and 6. pushes the door open. It should be remembered that a chain cannot be established unless the individual is capable of performing the individual links.
(4) Verbal Associate Learning

It is true that man is capable of a tremendous variety of performances with the use of his legs, hands and arms, It is also even more true that his vocalizations show an enormous versatility in social situations. Simplest verbal is illustrated in the activity if naming.

A child is shown an object as a doll. The next time if he sees the particular object he will be able to say that it is a “doll”.

There are two chains involved in this:

(i) Observing responses Ss—R connection that connects the appearance of the object and distinguishes it from other objects.

(ii) The second is the Ss—R connection that stimulates the child himself to say “doll”.

```
Object   Observing   Doll   Doll
```

Mediating connections between each verbal unit and the next must have been previously learned.

(1) Verbal units must be presented in the proper sequence:

(a) whole chain at a time,

(b) one after the other.

(2) The learner must actively make the response required by the chain.

(3) Cues may be used to learn verbal chains.

(4) Individual span of memory determines the length of chain that can be learned all at once 7 ± 2 is limit of verbal chain. Progressive part method is most efficient. There is no limit to verbal chain. People have learnt complete books verbatim.

(5) There must be provision for confirmation of correct responses in the learning situation.

(5) Type-5 Discrimination

What is discrimination? In the development of discrimination, we take one aspect of the environment and reinforce selectively some response to it. When the behavior shows a specificity of response to one given stimulus to the exclusion of others, we may say that a discrimination has taken place.

From the very beginning, the infant acquires simple discrimination and differentiation among the objects in his environment. He learns the difference between a feeding bottle and a simple bottle. In learning to walk and to talk, he differentiates more and more specific
movements out of a mass of random activity. Discrimination involves higher mental processes. It is the basis upon which we learn to think and solve problems.

**Generalization.** Watson conditioned fear response in Albert, by introducing loud sound. It was found further training fear spread to white rabbits, and other white objects. This spread of fear response is what we call stimulus generalization. When after initial conditioning to some stimulus, other similar stimuli can also operate in calling out the same response; the process is called stimulus generalization.

Another example is of Pavlov’s dog. If a dog is conditioned to salivate at the sound of a tone of given frequency and intensity, other similar tones and spund stimuli will bring out the same salivary response. If an organism is conditioned to respond to one stimulus, it also responds to a variety of other stimuli bearing some relationship to the initial conditioned stimulus.

Child learns the word “Daddy” in the presence of a given stimulus. He emits the same word to other stimuli i.e., other men, old or young. It takes further conditioning to narrow down the response “daddy” to one specific stimulus. Out of this process of generalization, fine discriminations take place.

**Differentiation and discrimination.** In discrimination, the emphasis is placed on the stimulus side but in differentiation, the emphasis is placed on the response side. In discrimination, through selective reinforcement, we eliminate the responses to other stimuli. In differentiation, through selective reinforcement of one of a number of related responses, we develop a very specific type of response in the presence of some stimuli. The two processes operate simultaneously in our personality development.

(6) **Concept Learning**

We deal with classes of objects as the stimuli, takes the class of object called tree. This may include all tall, short oak- mango-orange-since these objects share some characteristics in common. We discriminate them from other objects classed as dog, house or people. We form concept by finding properties which a class of objects shares in common. We learn generalization within classes and discrimination between classes.

We generalize within the dog class of objects to include those of various shapes, size, colour, but we discriminate them from the class of objects like horse, tree, house etc.

(7) **Learning of Principles**

Learning of principles depends on learning of concept formation and other forms of learning. Principles show regular relationship among two or more concepts. There are a large number
of principles that every individual masters in order to function properly and to work more efficiently. Most of the classroom learning contributes to the development of principles.

**Problem Solving**

Problem solving comes at the highest stage in the hierarchy of learning process. It depends on learning of rules. We will discuss this important topic

---

**Factors of Education**

**Maturation**

The concept of maturation has been borrowed from biology. It means physiological development of the child. Maturation and learning are closely related. For learning a definite level of maturation is essential. Maturation is specifically used for qualitative changes in the organism which are not induced by learning. Krogman defined maturation as aging. Baldwin (1955) defined as ‘maturation is an increase in competency and adaptability’. Maturation involves the biological processes of growth and differentiation. Training without attaining a definite level of maturation does not yield good results. The learning and training should start when a child reaches an appropriate level of maturation, which implies concept of readiness for an activity. The teachers and parents must see that the child has attained a definite level of maturation for learning. If training or learning is forced prior to the definite maturational level, the time and effort go waste and do not yield good results.

---

**Importance of Learning for Teachers**

You may ask a simple question at this stage: why should a teacher study learning process and the various theories developed by psychologists to explain this process? Needless to mention that primary objective of instruction in school is to bring certain desirable changes in the behavior of children through the process of learning. The prospective teachers have to take the job of teaching after completing their training. They must know the operations and approaches to learning to develop better teaching strategies. The teacher can be benefited by studying the psychology of learning in a number of ways. He can understand the individual differences in learning among learning and can adapt his teaching according to their requirements by using different teaching methods. The most important contribution of psychology of learning is the concept of motivation. The teacher may know the needs and motives of children at different age levels. He can motivate them. He can know
the concept of motivation as developed by various theorists of learning. He can organize those activities which create interest and motivation in children. He can know the process of remembering and forgetting and can utilize efficient methods to minimize the percentage of forgetting. He can help the students to transfer skills and information acquired in the class room to life situation outside the school. He can diagnose special difficulties of children and help them individually to overcome those difficulties. Modern psychology of learning lays more emphasis on social psychology of learning. The teacher can improve the social climate for learning by providing conducive environment in the class. Briefly we can summarize that the more a teacher knows about the fundamental principles of learning, the more efficiently he can guide class, room teaching-learning process.

DEFINITION OF MOTIVATION

Tremendous research has been done on psychology of motivation in the last 40 years and a number of new theories have been evolved to explain human behavior. K. B, Madson in his book “Theory of Motivation” has given twenty-four theories of motivation which propose different explanations of human behavior. It is not possible to reproduce all the definitions here. We will follow sample approach and will mention four definitions.

Historically, the word ‘motivation’, comes from the Latin root ‘mover’ which means to move. Thus we can say that in its literal meanings motivation is the produced ad regulated through the release of energy within the tissues.

(1) H. W. Bernard “Motivation refers to all those phenomena which are involved in the stimulation of action towards particular objectives where previously there was little or no movement towards those goals.”

(2) Atkinson defined motivation as, “The term motivation refers to the arousal of tendency to act to produce one or more effect.”

(3) Maslow has advanced the theory of hierarchy of needs ranging from basic physiological needs ending, fluctuating and complex and that it is an almost universal characteristic of particularly every organismic state of affairs.”

(4) D. O. Hebb, “The term motivation refers (i) to existence of an organized phase sequence, (ii) to its direction and content, (iii) to its persistence in given direction or stability of content.”
Psychologists have analysed the motivated behavior of an organism and observed the following functions of such type of behavior.

1. **Motives energize and sustain behavior.** Motives energize the behavior of the organism and arouse him for action. The energy can be physiological as in drives or reintegrative resonator activity aroused by similarity between present action and residues of past ones that were emotionally significant for the person. The energy is supplied in proportion to the amount of energy output for a task. Motives not only energise the behavior but they sustain our interest and behavior for longer period in the activity. According to Hebb, efficiency and adequacy are increased in motivated state of behavior.

2. **Motives direct and regulate our behavior.** Motivated state is often described as guided, directed and goal-oriented. The motivated behavior moves in a specific direction. The behavior of the organism is purposeful and persistent. The direction of motivational behavior is, no doubt, very complex because of the structure of the situation and the action determine the behavior.

3. **Behaviour is selective.** Under motivated condition, the behavior of the organism does not move in a haphazard way. It is directed towards a selective goal which the individual sets for himself. For example the student who is motivated to secure high grades in the examination, concentrates on his studies by selecting appropriate means to reach his goal. The motive is terminated by the achievement of the goal.

**Motivation in the Class**

In the preceding part of this chapter, we have briefly surveyed the development of the concept of motivation and its major theories. Now we will deal with the practical aspect of motivation in the classroom teaching-learning situation. Every teacher daily faces a number of behavior problems. For the explanation of these problems, he needs to turn to psychology of motivation. This is a great problem for teachers, parents and administrators and for those who are interested in the improvement of performance and learning of people for action. Students in the class-room learn to receive constant motivation from the teacher so that maximum use of their talents may be made for their welfare and also for the welfare and progress of the society. Though the process of motivation is highly individualized activity in the sense that causes underlying behavior are always multiple and complex rather than single and simple. A learner may be motivated for an action in a particular situation and the other learner may not be motivated in that situation and even the same
learner may not be motivated under the same situation on some different occasions. A number of variables operate in the process of motivation which cause variation in the individuals. The socio-economic condition, previous experience, age and social climate in the class-room effect the process of motivation.

Psychologists have development some common techniques which may be used by class-room teacher to motivate children in their work. The teacher should be strictly adhere to one theory of motivation but he should make use of various approaches in his teaching, keeping into consideration the individual differences among the studies. Below are given some of the important techniques of motivation in the class-room teaching-learning situations.

1. **Use the principle of pleasure and pain.** The oldest theory of behavior holds that pleasant experiences which give satisfaction are sought and painful experiences are avoided by the organism. This theory has direct implication in class-room teaching-learning in the sense that the teacher must provide pleasant and satisfying experiences to his students. Such type of experiences will motivate students for further learning.

2. **Use rewards and punishment.** The teacher must occasionally administer reward and punishment in his class-room teaching. Rewards create interest in the students. They are motivated to get the reward. The teacher must use punishment very sparingly because punishment creates behavior troubles. He may use reward of different types, as material, symbolic and psychological. Rewards have a positive effect in motivating children for learning. The teacher must remain cautious that the reward should not become an end in itself but it should create learning desire in the learner. Recent studies conducted on reward have proved that reward in the form of grades tends to encourage conformity and inhibit creativity in the learners.

The teacher must see that rewards for learning should be so engineered that after serving their introducing role, they should lead learners to independent learning beyond the classroom situation.

3. **Aspiration level.** It means the level of performance to which one aspires for future. The teacher must see that the activity of the class is tailored in accordance with the aspiration level of the students. The teacher should design the level of difficulty of class-room task keeping into consideration the level of aspiration of the class. According to Barow (1956) level of aspiration depends on several factors like intelligence, socio-economic status, relation and expectation from children. The teacher should organize activity in such a way that student should
keep striving and give a promise of goal attainment. Classroom goals should be attainable and the students should feel that they are able to achieve them. School work must be sufficiently varied and paced so that every pupil may succeed at his level. The students should be encouraged to participate in learning activity in the class. The students active participation is very essential to arouse their interest in learning.

(4) **Use praise and blame.** It is human nature that everyone wants some praise for his achievement. An experiment was conducted by Hurlock to study the effect of praise and blame on children. She found that praise is more effective than blame for motivating children. Praise and blame have different effects on individual students. Some students may be praised for minor achievement because of their limited abilities but others will be motivated by praise for most worthy accomplishment related to their high ability. Praise can be used in many ways, like a nod of teacher, smile, a good look, and verbal praise etc. The teacher should be cautious while using praise in the classroom. For each and every activity, children should not be praised. Blame should be sparingly used because it creates personality maladjustment. Successful use of praise and blame depends upon the students, their personality, and prior learning experiences.

(5) **Use of competition and cooperation.** Teacher should stress friendly relations rather than rivalry that breeds interpersonal antagonism among the students. Competition should involve a degree of equality among contestants.

**Competition may be of three types:**

(a) Interpersonal competition among peers.
(b) Group competition
(c) Competition with oneself.

The teacher can use all the three types of competition in his teaching. Like competition, cooperation is also a strong incentive for motivating children. Lowry (1969) has concluded on the basis of his studies that cooperation is most basic form of intergroup relationship. Competition and cooperation both can be used in the class-room learning for gaining high scores. The teacher should encourage active participation of all the students in learning activities.

(6) **Knowledge of the result (feedback).** It is true that some events following a response tend to increase the frequency of the response. The events are commonly called as reinforcers and constitute a broad category of events. Some of the reinforcers have been mentioned above as pleasure and pain, reward and punishment, praise and blame etc.
Some confusion exists between the term reinforce and knowledge of the result (feed-back). Let us first clarify it with the help of an example: A child is given a chocolate for remaining quiet in the presence of a visitor, and this increases the probability that quiet behavior will occur next time, a visitor comes. The chocolate here works as a reinforce. Second example: A child correctly responds to a question in the class. The teacher says "that is right" the statement of the teacher is likely to reinforce the behavior of the child. Here the teacher is providing information (feed-back) about the correctness of the response. Generally psychologists classify these events under the broad head reinforcers on the basis of their consequences. Reinforcers include food, praise, nod of head, smile and giving information etc. There are various aspects of reinforcing events which are sometime called knowledge of the results or feed-back.

As already mentioned B.F. Skinner has developed a technique of learning called programmed learning. The learner immediately gets the knowledge of his performance in programmed learning whether he is right or wrong. This knowledge of the performance of the learner works as motivating force in learning task. Learners continually remain involved in the learning activity. Learning is faster and effective when the learners are provided with the knowledge of their progress. It has been experimentally established by psychologists that knowledge of result facilities motivation and improves content mastery of the learners. The teacher should provide feed-back to the students to motivate them in learning.

(7) *Novelty.* Every novel thing creates interest in the individual, teacher must introduce novelty into his teaching. Novelty has merit when teacher points out the relation between the new and already known, uses familiar procedures and himself shows enthusiasm or the expansion of knowledge into new areas. The teacher should present subject matter in a variety of ways to bring novelty in his teaching. No doubt the development of such a situation taxes the teacher's ingenuity to the limit and often calls for more free time than any teacher can give. Some encouragement of this approach is found in present trends toward giving teachers time during school hours when they can develop such materials but many schools have limited resources for such activities.

According to Travers, one of the essential ingredients involved in energizing pupils in the classroom is the provision of materials that permit them to move into ever new fields of exploration. The subject matter should be presented in novel ways so that curiosity and interest of students may be maintained.

Travers is of the opinion that the teacher may turn the task into game, particularly, small children cannot sit idle in their seats in silent contemplation of their work but they do like to play games with other children. Some components of many different subject matter can be converted into games that two or more pupils can play. The school subject in which game has been used to the greatest advantage is mathematics.
(8) Setting of goal. Motivation is goal-oriented behavior that leads to drive-reduction in the organism. We can mention that the goal, which the student sets for himself, plays an important role. If a student has a worthwhile goal, then he is willing to forego immediate pleasure and even expose himself to some suffering in his effort bring him closer to his goal. Goal-setting is an important component of human motivation. Teacher should set goals both for individuals and the class goals which are attainable.

(9) Avoid the use of stressful procedures. No doubt, some amount of mild anxiety accelerates the problem solving efforts of the student but too much anxiety and tension disorganizes the cognitive process and hinders the performance of the learners. The teacher should create mild tension in his students to motivate them.

(10) Provide real life and symbolic models. It is a fact that most of the learning in human beings is acquired through the process of observation and imitation. The teacher can influence the behavior of his students by his attitude and ideal living, written or verbal presentation and by use of audio-visual techniques.

(11) Create needs to learn and involve students. The teacher must create psychological and social needs for learning in his students. The importance of class room learning should be related to future life of the students. The students should be actively involved in learning task.

In the following paragraph, we are giving twelve practical methods of motivating people. These methods have been identified by McClelland (1962) from researches conducted by him.

1. Goal setting. Describe and set goals that learners will achieve.
2. Giving reasons. Tell the learners that the course is important for successful living.
3. Teaching thoughts that motivate. Drive and determination lead to success. Create confidence in learners.
4. Relating thoughts to action. Learners should be encouraged to study in library, take interest in doing things and show interest in others.
5. Relate the course to life. Tell the learners how learning experiences in the class-room are related to life.
6. Keep a record of progress. Teacher should keep the record of progress of learners and should inform them from time to time to reinforce their behavior.
7. Give warmth and support. Teacher should give warmth and support to the learning experiences.
8. Provide good environment. Conducive environment should be created in the classroom.
9. *Deal with cultural values.* Inculcate cultural values.

10. *Get commitment from the learners.* Get some verbal commitment to a level performance form learners.

11. *Demonstrate progress.* Keep charts on individual learners.

12. *Use group dynamics.* Make use of group dynamics.

There are many other techniques which have been successfully used in other countries. The important techniques are team teaching, use of discussion method, developmental task, success and failure and programmed text. We can also use these techniques in our schools and can test their affectivity.

In spite of all the techniques referred above, the place of the teacher remains supreme, his method of teaching, warmth and his techniques of handling class-room problems play an important role in the process of motivation in the class-room teaching.

**THE GENERAL NATURE OF ATTENTION**

ATTENTION is always present in conscious life and is common to all types of mental activity-knowing, feeling and willing. It is the primary pre-condition of them all. We must attend before we know, feel or act. It is a characteristic of all conscious life. But attention is more essentially cognitive. It is the concentration of consciousness upon one object rather than another. Attention is the heart of the conscious process. When we are conscious of an object, it means that we aware of its presence in the environment. To attend to an object means to be aware of it more keenly and intensely than of anything else, to hold it in the focus of consciousness. While we are conscious of every object we attend to, we do not attend to every object we are conscious of. Consciousness is a wider field and includes that of attention. We attend only to a part of the field of consciousness; the rest is not attended to. Thus there are two fields: one of attention and the other of inattention. The former coincides with the margin of consciousness. Reading a book I am conscious of a large number of objects in the room and on the table. I am conscious of the ticking clock, the table lamp, the pen-stand, papers, myself sitting in the chair and numerous other objects but I am more distinctly and clearly aware of the words and sentences that I read and of the ideas they mean. That is, I am aware of a large number of objects about me but I attend only to some of them. This may be illustrated by referring to a lighted room. Objects near the lamp are seen clearly and distinctly while objects removed from it are seen dimly vaguely. Similarly the field of consciousness contains a central portion where objects are clearly apprehended and a marginal area of objects apprehended indistinctly. The former is the field of attention, the latter of inattention.
But though attention is the core of consciousness, it is not an end in itself. Attention is for the sake of something else. It is an attitude of readiness or preparedness for action. Woodworth cites familiar instances of it in the military command of ‘Attention:’ and the athletic call of ‘Ready’. It is this sensitively conscious and preparatory attitude of mind which is characteristic of attention.

Perhaps the nature of attention can be better understood by describing its general characteristics.

In the first place, attention is not a fixed state nor a faculty or power of mind. It is an activity, a growing process and like every mental act it cannot be centered round any one object for a long time. It is constantly shifting from one object to another. Even when we attend to the same object for some time, attention shifts from one aspect of it to another. In reading we attend to the changing, growing argument and different stages are attended to in quick succession. We have distinguished between the focus and the fringe or margin of consciousness, and the former we have called the field of attention. Now objects are constantly passing from the margin to the centre of focus. It is very common to compare the entire field of consciousness to a dome of stimuli trying to attract attention. To this dome there is a base and an apex. Objects attended to stand at the apex of the dome, while objects of which we are altogether unconscious lie at the base. The objects of attention stay at the apex or in the focus of consciousness for the shortest possible time and are displaced by others.

Secondly, the process of attention has all the three aspects of conscious life, knowing, feeling and willing. Not only does it help us to see and know objects clearly, but it is also a kind of striving and is accompanied by some feeling in the form of interest. We attend to reach a goal and because that goal is determined by our dispositions, instinctive or acquired, the idea of its achievement gives us pleasure and interest and the goal is seen and apprehended more clearly and distinctly. Attention is cognitive, co native and affective.

Thirdly, **attention is selective**. We do not attend to everything that comes our way. Only those stimuli which have some advantage are able to attract attention, others are ignored. The passage of objects from the margin of consciousness to the focus is regulated. Even when we attend to the same object for some time we attend to some aspects of its more carefully and clearly than to others. Attention represents a narrow field and is selective. Most of our achievements in life are due mainly to this selection. If we try to attend to everything without limiting our range, we will not be able to achieve anything.
THE IMPORTANCE OF ATTENTION

Attention is a preparatory attitude and involves important physical adjustments. Watch a student fully absorbed in listening to the teacher and you will have a picture of such adjustments helping the attentive process. These bodily adjustments are very necessary and bring out the value and importance of attention.

In the first place, attention increases efficiency. Before the race starts the runner is ready to jump off as soon as the signal is given, ‘Are you ready?’ is the signal which brings about an increased state of motor readiness and he responds very quickly to the second shout, ‘Go!’.

Secondly, attention greatly improves sensory discrimination. It seems to have the effect of a bright searchlight throwing up the details of the whole landscape. It does so in two ways. In the first place, all objects attended to attain a degree of prominence in consciousness which they lacked before they were attended to. Attentions to them makes them ‘stand out’ more conspicuously than the surrounding objects. Secondly, objects attended to are ‘separately discerned’. We isolate them from the rest of the environment to examine and know them more comprehensively, and to realize some purpose with regard to them. Owing to attention our awareness of objects which was vague and indeterminate becomes distinct, definite and clear. That is why we speak of attended objects as having entered the ‘force of consciousness’, or the field of concentrated consciousness.

Thirdly, attention is necessary as a means to the acquisition of skill. The typist, the cyclist or the tennis player must attend closely to his hands and movements, to their coordination and control, and it is only when he attains proficiency that attention drops out.

Lastly, attention is very helpful to remembering. Those experiences which are carefully attended to are remembered more accurately and fully and those which we notice only cursorily are soon forgotten.

CONDITIONS OF ATTENTION

Such being the value of attention, it is very necessary that it should be controlled; and one of the tests of sound education is that it promotes such control and direction of attention into desirable channels. Mention has been made of the fact that there are certain factors of advantage in the securing and holding of attention. Let us now discuss those factors of advantage or conditions which determine the passage of stimuli from the field of inattention to that of attention. Such conditions are of two kinds, objective and subjective, those that are found in the objects and those that lie within the person.
Of the objective conditions the first is **intensity** of a stimulus. Other factors being equal, a strong or intense stimulus will attract attention. A loud noise has the advantage over a low murmur; a street band compels attention while a low hubbub does not. The second is **size**. A large building will be more readily attended to than a small ’hut. The advertiser uses large type in his notices to attract attention. The third is **change**. To attract attention the change should not be gradual but sudden. We do not notice the clock ticking on the wall but it arrests attention as soon as it stops. Fourthly, **repetition** secures attention. Objects presented again and again cannot help being attended to. The fifth is **novelty and contrast**. New objects or objects different from what, we are used to attract attention more rapidly. We are aware how familiarity detracts attention. Common household objects are not attended to because they are too familiar.

**The subjective conditions determining attention may be summed up in one word, interest.** We attend to objects in which we are interested and we do not attend to those which do not interest us. Interest and attention go hand in hand. We are interested in objects to which we attend and we attend to objects in which we are interested. Interest means making a difference. We are interested in objects because they make a difference to us, because they concern us. Interest may be most defined as ‘the felt value of an end’, as the feeling which accompanies special attention to some object. It is obvious that the two factors, attention and interest, are inseparable and that they develop simultaneously. Ordinarily interest is less dependent on the objects outside than simple attention; it is more a function of the person himself. That is why interest has a more enduring and persistent quality that attention lacks. As education lays stress on stable and enduring aspects of experience, most of the teaching is devoted to securing interest rather than attention, and most of the useful material on the subject of attention is presented under the head of interest.

Interest is both cognitive and affective. When we are interested in an object, we observe and study it, we want to know more about it, it gives us a feeling of satisfaction and we may act to change it, or keep it unchanged. Since interested predisposes the organism to react in certain ways both to know and to act and is tinged with feeling and emotion, and there may be endless variety in these ways, we have begun to speak of **interests** rather than **interest**. But a pleasant feeling of satisfaction and a dynamic tendency to seek the object, to understand more about it and to do something with it always accompanies our interest or interests. Interest in history means one enjoys studying it, attending to facts and movements historical. A measurement of one’s interests is also a measurement of what one will do or what one can do.
Attention is usually of two types, the involuntary and the voluntary. Involuntary attention is passive and free. It depends upon the striking qualities of the stimulus and the way in which the stimulus affects the person attending. Involuntary attention is given to an interesting object, as when a charming speaker holds us spellbound, or when a thrilling story absorbs us, or when we open the door to find out who is shouting. When we attend naturally, easily, spontaneously, without any effort of will, attention is involuntary. Any object will attract such attention if it is brightly coloured or makes a loud sound, if it moves quickly, or is repeated, or if it arouses our interest. When the teacher wants to attract attention he should present objects to pupils in such a way that they show these qualities. Attention is voluntary when it is given to uninteresting objects, when it requires some struggle, effort of will. It is sustained, active, forced. It is not given whole heartedly, like involuntary attention, but under the stress of some problem, difficulty or end to be achieved, as when we go through a railway time-table to find out a suitable train, or try to understand a difficult argument or lesson, solve a sum in arithmetic, or check a bill. We prescribed ourselves a goal and to accomplish it we have to attend to it. In involuntary attention, we yield ourselves to the stimulus, in voluntary attention we make up our mind to attend. Both types of attention are governed by the subjective and objective factors described above. But in some causes there is a fluctuation of attention between conflicting stimuli of which one is easier, pleasanter than the other. When we attend to the more difficult and uninteresting, attention is voluntary. Fortunately attending to an uninteresting object often makes it interesting if we succeed in our task and are satisfied, and voluntary attention is re-placed by free, involuntary attention. In teaching, attention in the beginning is voluntary, the teacher explains the value of the subject or the lesson and the pupils address themselves to understand it. But the aim of the teacher should be to make it effortless and involuntary by making the lesson interesting and by arousing the instinctive and acquired interests of his pupils.

By the span of attention is meant the number of objects to which we can attend at any one time. Speculations in the past fixed the number at five or six but today we have experimental data. We can attend to only one thing at a time. This may be said to be contrary to common experience. In reading one can attend to many letters and also words. The span of attention with regard to vision is measured by an instrument called a tachistoscope. The subject is given a momentary glance at an irregular group of dots, and is required to report how many he has observed. It has been found that an adult can note at the most six dots. But they are not attended to separately but as a whole, as forming one single situation. We can attend to a number of objects only in so far as they form parts of a single complex
whole. The object of attention at any one moment is a single one though not a simple one. Where this unit is lacking we cannot attend to more than one object. The different facts fuse together and form one process. The man in the street will cite cases where two entirely different processes are carried on simultaneously. In all such cases either there is an oscillation of attention or the two are attended to as parts of one.

SOURCES OF INTEREST

The primary source of all interest is to be found in our native desires and urges, instincts, primary needs and motives. Living brings are so constituted that they are interested in certain things from their very birth because they satisfy their natural desires and needs. The chicken is interested in pecking, the wasp in mudhouse building, the birds in nests, infants in bright moving objects, growing-up children in games and sports, because original natural has inclined them that way. A thirsty person does not attend to anything but water, a mother may be deaf to the noises in the street but she is alive to any sound how every faint coming from the next room where her baby is sleeping, and children in a class prick their ears when the teacher says ‘Let me tell you a story’ because their interest in stories is natural and strong. To catch and hold the attention of children we arouse their curiosity, appeal to their love of mastery, make them compete and emulate. Instinctive drives are powerful motive forces in behavior and give us a fund of interest to be directed into useful activities.

We have already listed a number of instincts and needs. They give the individuals impetus to act which we call drive. A drive is an urge or push from within, it has no direction but is just focused energy but through learning the individual acquires goals and purpose which impart a direction to that fund of energy. Then we speak not of instincts, needs or drive but of motives. A motive is a drive which through learning has acquired a direction through aims and objects, goals and purpose. These motives are spring of interest.

But apart from primary needs we have psychological needs of security, affection, recognition, new experiences and self-actualisation. They are acquired through social experience and are learned. Since most of our activity has social implications these motives provide very strong interests for effort and attention.

Since acquired interests differ with different individuals a number of persons behave differently in the same situation. A professor a confectioner, a bookseller and a child will behave differently when they are placed in a library. The professor will select books for reading and study, the confectioner, if he does anything at all, may select books of large size thinking they would give him enough waste paper for packing sweets; the bookseller may start calculating how much profit he would have made if all those books has been
bought at his shop, and the child will surely choose those books which either have brightly coloured covers or contain nice pictures. Such differences in attention and behavior are due to differences in acquired interest.

Much of acquired interest may be traced to our sentiments and complexes. A person who has a sentiment of patriotism is likely to attend to everything that will affect the welfare of his country; if we have a sentiment of love for a particular person we attend only to his or her good points and fail to notice his or her faults. One who has an inferiority complex will readily attend to and mark the mistakes, weaknesses and faults of others and will fail to attend to their merit or accomplishments.

Our interest is also determined by our attitude and mood of the moment. If we have a friendly attitude towards a person or are in a cheerful frame of mind, we attend to his good points and emphasise them. If we are in a mood to worry, we try to find out things that will find us with imaginary dangers.

Our interest also depends on our education and training. A tailor will notice the dress of the passer-by; a barber, his hair; a boot-black, his shoes; a pick-pocket, his pocket; a tonga driver, his hurried pace and possible destination and so on. In the course of life and experience we all acquire goals and purpose, principles and ideals which determine what things we are interested. Habits, attitudes, customs and the limit the field of our interest.

**THE PLACE OF INTEREST IN EDUCATION**

Interest is the feeling which prompts us to spontaneous activity. It has been described as ‘the felt value of an end’. It is something urgent, active and stimulating. We have an interest in constructing things, in buildings, in telling, in finding out, in competing. We have already seen that our instincts are powerful sources of interest. There is a tendency among many psychologists to identify interest with instinct but there are important differences. Instincts are racial characteristics, interests are individual and subjective. It is possible to kill and root out interests without much injury to the person. A child’s interest in harmful books is not difficult to eradicate but it is not desirable nor easy to root out instincts of curiosity or construction. Interest also grows out of acquired dispositions like tastes and sentiments, complexes and habits, moods and attitudes.

Interest is both an end and a means in education. From the point of view of the child, interest is a means, for with its help he is to acquire knowledge and realize his purposes. For the teacher, it is an end. Once interest is aroused in good conduct, studies, games or literature, the child will consider no sacrifice and effort too great to attain proficiency. Every wise teacher aims not a communicating knowledge to young people but at stimulating them to acquire it themselves. For him, awaking or building a strong wholesome interest in the subject is itself an end towards which all teaching methods and practices are directed.
The place and function of interest in education is the subject of a keen controversy. One view is that the school is a preparation for adult life and since adult life is full of bitter struggle whose knocks are hard and unrelenting, discipline in the school should be strict and merciless and the child’s path should be strewn with trials and tribulations so severe that they teach him to face hardships and put forth strenuous effort against odds. Such an education will fit the child for life admirably. They condemn the ‘interest school’ as ‘soft pedagogy’ or ‘sugar-coating’ which will lead to flabbiness of character, killing effort and endurance among young pupils.

On the other hand, it is maintained that education is not a mere preparation for life, it is life itself and the joy which children in doing, constructing, collecting or finding out, should not be lost to them in the school. Interest is the pleasure tone of self-expression and self-activity and is a great asset to teaching and learning. Undue emphasis on effort makes the child work from a sense of fear and kills his spontaneity and initiative. It is psychologically false and morally wrong to turn the child’s work into drudgery, and expect him to do his best.

Both these views are based on a misconception that interest and effort are mutually exclusive forces. They are neither mutually exclusive nor forces which influences learning and behavior from without. Interest is not a quality which belongs to the subject-matter and which will solve all difficulties. It is something within the child, and the question is not how to make a lesson interesting but how best to interest the child in the lesson. Making lessons interesting does not mean making them easy and simple but arousing, stimulating or direst children’s interests in the lesson. Interest is a subjective feeling and, when it is aroused for the achievement of a goal, the individual puts forth his greatest effort. Interest and effort are not opposed to each other. The promptings of interest lead effortful striving. The end of interest is not entertainment or amusement but activity, effort, accomplishment. It has already been stressed in dealing with play-way methods in education in the last chapter that interest leads to effort and induces children to do their best from inner necessity. Again, things begun with effort soon acquire interest. Many schools make games compulsory for children and though children in the beginning do not like it, they develop an interest for them later on. When effort brings achievement and satisfaction, it inspires children with a new zest and enthusiasm and is converted into an interest. The child begins because he has to, but he continues because he wants to.

But if effort is to awaken interest and if interest is to lead to efforts, the teacher should secure both through worth-while ultimate goals and not through immediate superficial objectives. Let children not be asked to work for prizes and marks, for cheap applause or even mere examination success, but for life purposes, chosen ideals, noble aims and aspirations. No doubt the former group have their place and value but they should be subordinated to higher aims and ideals.
LEARNING

HOW TO AROUSE INTEREST IN A LESSON

Attention makes for great efficiency in adjustment and learning and one of the major problems of education is to secure the attention of the child to the lesson that is in progress. The objective and subjective factors on which attention depends have already been described and no doubt every teacher will bear them in mind in preparing and presenting lessons to his classes. All that is aimed at in this section is an emphasis on broad principles of teaching by which children’s attention and interest can be easily secured.

In the first place, the teacher must recognize that children’s interest varies with age, and he must know what differences in interest arise at different stages of their development. The centre of teaching is the child, not the lesson, and it is the lesson which is to be adapted to the needs and interests of the child, not the child to the lesson. At different stages of child like certain well marked interests predominate. The teacher should be familiar with them and should adjust both the subject-matter and the method to the capabilities and mental development of his pupils. The standard of teaching should not be so low that pupils consider it unnecessary nor too high that they consider it beyond their reach. It should be well within their power of understanding. For example, in the infant classes children acquire knowledge mostly through their senses, and systems of education like the kindergarten and Montessori have a greater appeal. Later, memory and imagination mature and the pupil cannot only remember well but also represent what he has read. Still later, though and reasoning develop and he is interested in knowing the ‘why’ of things. Thus to expect small children to think and argue will be futile. Children’s curiosity, a dominant factor in all learning should be kept alive and the appetite for knowledge should not be allowed to run low.

This leads us to the second principle. Interest cannot be aroused unless we justify to the pupils the value and importance of what they are going to learn. It means that for learning a lesson pupils should have a motive, and this motive comes to them wither in terms of the practical value of what is to be learned or in terms of the appeal the lesson may have to their urgent instinctive desires. Most teachers of science, grammar or arithmetic begin their day’s work with a commonplace fact and lead the class to the lesson through stages which impress upon the class the need and value of the new knowledge. Such lessons are attended to with interest.

Thirdly, all new knowledge should be related to that which the class already possess. The teacher should know intimately what are the acquisitions of his pupils and plan his lessons in such a way that they appear to children as a continuation of what they have already learnt.

Fourthly, the teacher should avoid monotony, for that kills interest. Variety is a safeguard of interest and should be preserved by presenting lessons from a new angle. The
subject-matter should be frequently re-cast and reviewed to provoke thought among pupils. Often a new point of view, an emphasis on a different aspect of the subject, a new organization of the material, will arouse active interest.

Lastly, **the teacher should approach the class and his work of teaching with great enthusiasm and interest.** This fact about the teacher’s attitude cannot be over-emphasized. A teacher who enters the class smartly, smiling and giving a good impression about his earnestness and interest in his work, will receive greater consideration, attention and interest at the hands of his pupils than the one who is listless, indifferent and tired. Interest is the feeling tone of conscious life and is contagious. The teacher has not only to take interest in his work but also show that he is truly interested. There are teachers who fill the classroom with an atmosphere charged with electricity, their mere presence sends a wave of enthusiasm among young pupils, and they are able to secure attention and interest by a mere look, a question or a gesture. Their vitality, sense of humour, interest and love for work, do the trick.

### HOW INTERESTS EXPAND

A commendable aim and means of effective education is expansion of the interests of young people. A plea has already been made that teachers should closely study the native interests of children and base their teaching programmes and efforts on the. This is not difficult and when taking children’s interests as the starting point the teacher offers them experiences that have some immediate connection with them their interests will naturally grow and expand. There are endless ways in which this can be accomplished. For example children are very much interested in dogs. They may be asked to narrate what they know about them, to read about different breeds of dogs from books in the library, to collect stories about dogs and to write a composition about them, and so on. They will gather much more information in this way and the range of their experience, knowledge and interest will be greatly enlarged. William James in his famous book *Talks to Teachers on Psychology* writes: ‘Any object not interesting in itself may become interesting through becoming associated with an object in which an interest already exists. The two associated objects, grow, as it were, together; the interesting portion sheds its quality over the whole; and thus things not interesting in their own right borrow an interest which becomes as real and as strong as any natively interesting thing.

Such enlargement of experience and interest is made possible because things in this world are closely associated so much so that one thing leads to another. Man, animals, plants, climate, soil, health, medicine, doctors, hospitals, social welfare are all bound together in one systematic whole and the teacher can carry children’s interest from one item in that system to another. Here lies the great merit of the project method of teaching in which we teach through purposeful units of experience and work and the various subjects of study are inter-connected and taught through projects. Girls running a sweet shop at the school
fair learn not only how to cook and make eatables but also how to sell them, to keep account and calculate gains. Boys running a school magazine will learn much about composition printing, proof correcting, grammar, and business practice. Such activities and experiences will expand and enrich their interests.

The absence of distraction is an important condition of effective attention. Distraction may be defined as any stimulus whose presence interferes with the process of attention or draws away attention from the object to which we wish to attend. Ordinarily, noise or absence of quiet is considered the main distraction, but the conditions of distraction are varied. Some seek solitude to concentrate attention, others find solitude itself a great distraction. Dead silence is not conductive to profound mental application: for one thing, it does not challenge the mind to greater effort to concentrate attention.

Of the conditions which hinder attention, the more common and prominent are abnormal temperature-too cold or too hot rooms, improper lighting, uncomfortable seats - the desk or the chair may be too high-ill-health, fatigue or worry, and the teacher wishing to control attention should try to remove them as far as possible. But very often the reasons we give for our inability to attend are only excuses. Students who complain of too much noise or of crows in the library to read, hear no noise and notice no crowd when they are busy reading letter or talking to a friend. He who is always complaining against distraction for his failure to study may be deceiving himself by offering lame excuses for his unwillingness to study. Distraction many be overcome in several ways. One is to run away from the distracting stimuli. If noise does not let us attend, let us seek a quieter place or time. Another is to get accustomed to the distracting factor. One may develop a habit of not attending to it. The roaring stream among the hills may prevent us from concentrating attention, may even prevent peaceful sleep, but we soon get used to it and carry on our tasks without feeling distracted.

Often distraction calls forth an extra mental effort to fix attention and apply oneself to the task. Experimental studies have revealed that under conditions of distraction are often achieved best results in attention and learning, because the subject puts in greater energy to keep the objects before the mind. Under the stress of examination many pupils muster greater effort to overcome • distractions and achieve higher aims. But this is not very desirable. They should work under conditions which do not require this necessary drain on their energies.

Finally, an alert, determined, hopeful attitude is very helpful to attention, and if pupils have developed a robust attitude ti work and study, distractions instead of annoying and upsetting them will simple help to arouse them to greater effort or at the worst to adapt their routine to them. Interest, enthusiasm, confidence, smartness, in brief the mental attitude of the learner, is of primary importance in securing attention in the face of distractions, and the teacher’s greatest problem and duty is to cultivate among his pupils a favourable mental attitude towards the school, the teacher and their work.
Intelligence as an inborn capacity is to a large extent an abstraction, and is not a subject of direct measurement. But it is accepted by all that intelligence is demonstrable in the ability of the individual to make good response from the standpoint of truth or fact. It is an ability to adjust adequately to new situation and at the same time an ability to learn. We often to say that an individual is intelligent in proportion to his ability to carry on abstract thinking. Some psychologists are of opinion that there are two kinds of intelligence—abstract, mechanical or social. Many psychologists observing relationship between different types of performance, have concluded that intelligence is a general ability. Spearman investigated this concept of intelligence and tried to analyze intelligence.

The Nature of Intelligence

Intelligence is a mental power or faculty. It is very difficult to give a logical definition of intelligence. Psychologists differ among themselves with regards to the nature of intelligence just as the idealist philosophers differ with regard to the nature of the Absolute. There is a saying that ‘so many psychologists, so many definitions of intelligence’. It is, therefore, needless to say that there is no definition of intelligent which is acceptable to all.

Man differs from the lower animals in so many important points that no comparison can be instituted between them. Hereditary behavior pattern is sufficient for the lower animals to adapt themselves to the environment. On the other hand, the human baby, after birth, remains for a few years completely dependent on others. What we understand by human behavior is mostly learnt or acquired. This learning goes on for long and ultimately the hereditary behavior patterns helps man to adjust himself to new situations. Evolving new behavior patterns and adjustment with new and changed circumstances are due to a special power or capacity. This power has been characterized as intelligence by many psychologists.

In the case of primitive man, intelligence which was not much needed was in most cases led by instincts. He lived in a simple environment and there was practically no problem, in the present day sense of the term, for him to face. As time passed, the primitive man’s environment became more and more complex; and his instincts could no more help him to adjust with this changed circumstances. He then found it necessary to apply his intelligence for solution of such problems. So, we find that the primary task of intelligence is to help one in solving problems and also help one in the matter of adapting oneself to new or changed environment. Intelligence is so subtle that it is very difficult to understand its nature. Behaviourists have sought to understand and measure intelligence by one’s performances and conversations. But they have failed to present clearly the nature of intelligence. We can only say that individual differences is intelligence. We can only say that individual differences in intelligence are evinced and, hence, this intelligence is innate power. Everybody has intelligence in a greater or lesser extent and it can also be measured to some extent.
Definitions of Intelligence

Psychologists have variously defined intelligence. Thorndike has called it the ‘sum of various capacities’. According to Cyril Burt intelligence is ‘the power of readjustment to relatively novel situation, by organizing new psycho-physical combinations’. Pinter, following Burt, defines intelligence as ‘an evaluation of the efficiency of a reaction or a group of reactions under specific circumstances’. Dearborn holds that ‘intelligence is the capacity to profit by experience’. According to Terman, ‘an individual is intelligent in proportion as he is able to carry on abstract thinking’. Woodrow has defined intelligence as ‘a capacity to acquire capacity’. There are some psychologists who define intelligence as that faculty which is measured in intelligence tests.

The above definitions may be grouped under three classes. Some definitions have laid stress on abstract thinking, some on the capacity to learn and some on the capacity of adjustment. We think that the definitions which fall under the last group are more important than the others. We may define intelligence as the inborn capacity or power to associate ideas with events and to adjust ourselves with environment. But we cannot thereby ignore the capacity to learn. Without the capacity to learn, it is not possible to adjust ourselves with environment.

An Example

We have seen how and why a man learns in his day-to-day life. There are also cases where a man learns after unsuccessful activities. There are seen individual differences in learning. He is surely more intelligent who learns first. So in the matter of intelligence also, there is individual difference. To take an example,-Ram, Shyam and Jadu (all of the same age) are given separately three quinine pills to swallow. All of them threw the pills away immediately after putting them in the mouth. Next day the same pills are given. Ram and Shyam refused to accept the pills, whereas Jadu put the pill in his mouth. Next day Orisul pills given. Ram refused, but Shyam and Jadu put the pill in their mouth. Here we may say that Ram is more intelligent than the other two. He has been able to understand the similarity than the other two. He has been able to understand the similarity of the two pills. Shyam is also more intelligent than Jadu, because on the second day he refused to accept the pill. Hence, intelligence helps us in ascertaining the relation between things.

Concept of intelligence

From the hoary past philosophers and psychologists have been trying to explain the nature of intelligence but in vain. We are ashamed to say that the exact nature of intelligence still remains a mystery. But the baffling nature of intelligence could not pour cold water on the enthusiasm of the psychologists who tried off and on to unveil the mysterious nature of intelligence. And in course of time, several theories have been clustered around the nature of intelligence. Of these theories only three are important, each of which is presented here.
The Faculty Theory: According to the faculty theory intelligence consists of a number of relatively independent and largely correlated and specialized abilities of various types such as memory, imagination, honesty and languages and reasoning ability. This theory is closely related to the disciplinary conception of education. The essence of the disciplinary conception of education can be given in a few words; namely that it is the process of learning rather than the thing learned that is important and the basic thing in education. The pseudoscience of Phrenology is also one of the planks upon which the faculty theory stands. The balance of expert opinions is now so solidly against the faculty theory that as a theory concerning the nature of intelligence, it has no value whatever. Even the physiologists have found no evidence of nerve-centres corresponding to the alleged faculties of mind.

Spearman’s Two-Factor Theory: The famous British Psychologist, Spearman, presented his two factor theory in his epoch-making book ‘The Abilities of Man’. He writes that there is a common element G. This G is not what is called intelligence itself, it is a general factor that enters into all intelligent activities. According to him G depends on the general mental energy with which each individual is endowed. In addition to mis G, Spearman recognized special abilities or S-factor. It should be remembered that G is, according to Spearman, present in specific as well as in group factors.

Primary Mental Abilities Theory:

Spearman’s pioneering work gave impetus to large number of psychologists. In a sense his work may be regarded as a starting point for the present factor analysis approach to the nature of intelligence. What Spearman did was to make clear the new meaning of intelligence, which existed in a rather nebulous state in the mind of the educated class; to formulate an entirely new theory, based on new methods, both of which were to receive a further development in subsequent times.

Soon after the publication Spearman’s magnum opus ‘The Abilities of Man’, a number of enthusiastic psychologists began to make frantic search for basic factors in mental ability. In course of time, these psychologists claimed to have discovered some primary abilities or factors. Cyril Burt by his painstaking investigation found three factors-verbal, numerical and practical. In order to determine total activity these specific factors must
combine with G. Spearman compared these S factors to a large number of energies, which could be enlivened by this energy (G). The S factors are modifiable factors, whereas G is inborn and not educable. Spearman also recognized the existence of broad group factors. These group factors, such as mathematical ability, verbal and spatial ability arise from the overlapping of numerous S factor. These group factors are not so general as G, but certainly not so limited as S-factors. To be more precise, take the instance of a person whose mathematical ability (which according to Spearman is a group factor) is high. We may expect him to be good not only in mathematics, but in physics, engineering, and higher technical know-how as well, because in all these activities mathematical ability is a ‘must’. This according to Spearman’s two-factor theory, a general factor (G), group factors any many S or specific factors constitute intelligence. But the investigators of Minnesota Study of Mechanical Ability did not find a general factor (G) in their investigators. So, this investigation questioned the very basis of Spearman’s two-factor theory. Among the factor analysts. Turnstone raised the standard of revolt against Spearman’s two-factor theory. In 1938 he began to publish his investigation results serially. In all his investigation he did not find G at all, but he found seen distinct multiple factors. The seven main or primary factors are as follows:- Verbal (V), Perceptual speed (P), Number (N), Memory (M), Reasoning (R), Word-fluency (W), Space or visualization (S).

The findings of Thurstone produced great effects in the field of psychology. Though Thurstone’s findings have mathematical and psychology basic this cannot be accepted as final. Thurstone’s primary factors are not unchangeable or fixed in their respective sphere. Spearman himself criticized the findings- of Thurstone. Spearman pointed out that as Thurstone’s test were closely related they could equally well be analyzed to yield a general factor as well as group factors. The subsequent investigations carried on by factorial psychologists both in America and in Great Britain prove beyond doubt the existence of a general factor. The U.S.E.S.investigations found factors like verbal (V), perceptual (P), more Speed (T), Number (N), clerical (Q), finger dexterity (F), space (S), logic (L), manual dexterity (M), aiming (A) and also a general factor.

Psychologists like Vernon, Burt, Guilford have made important contribution in the field of Factor analysis. Godfrey Thomson, of the U.K. a psychologist, has put forward a new theory of intelligence of late. This theory is called the Sampling Theory of Intelligence. According to this theory human mind contains innumerable units of energy, the identity of which cannot be described at the present moment. According to Thomson the completion of a particular mental activity is possible because of the combination of a number of such units of energy during a mental process but how and which ones of those units of energy combine for the purpose noted above will depend upon the nature of that peculiar mental activity and also on the energy content of those units of energy which determine the process in which some quanta of energy come together and others keep apart.
The above mentioned theories concerning the nature of intelligence jointly or separately have failed to explain the true nature of intelligence. Each of these theories is still in experimental stage and hence cannot be accepted as final. It is not too much to say that the theories explained are not as yet perfect in all respects. It has not yet been possible to isolate and identify the ultimate factors of mental ability. And the question, what then is intelligence, still requires solution.

**Intelligence and Knowledge**

For practical purpose intelligence has been defined as the ability to earn or to adjust to new situations. Intelligence is innate and we cannot add a cubit t it by taking care or by making frantic efforts. Environment can’ do service or disservice but it cannot increase or decrease innate intellectual capacity of a person. And for this we define it as the capacity to learn new things. There is a difference between knowledge and intelligence. A person can acquire knowledge behaviour but he cannot acquire intelligence. Knowledge is acquired but intelligence is innate. In a sense intelligence is the medium through which knowledge is acquired and it is intelligence which helps us possess knowledge and apply it to new situations. Hence Ballard defined intelligence as the “relative general efficiency of minds measured under similar conditions of knowledge, interest and habituation”. But it should be noted that the relation between knowledge and intelligence is very intimate and close.

Pure intelligence cannot be tested and a perusal of any intelligence test will show now largely it depends upon knowledge. In every form of mental behavior intelligence or whatever name one gives to it, is conspicuous by its presence. And for this when one acquires knowledge and shows his capacity in applying it in various fields, we do not hesitate to say that the said person is intelligent or he has the capacity to acquire knowledge. Intelligence without knowledge is unthinkable.

**Nature of Innate Intelligence**

Some Psychologists and almost all laymen regard intelligence as a single ability common to all intellectual processes. We do not accent this all-pervading intelligence but we do accept that intelligence is an ability or capacity of some kind. It operates in various ways. It is found in higher rather than lower mental processes and in novel situations.

**Innate Intelligence cannot be Measured**

Pure intelligence cannot be tested. When we say that we measure intelligence by using intelligence tests we mean or less ‘innate, general cognitive efficiency’ as Burt puts it. An intelligence test is a form of examination no doubt, but is main task is to get a sample of the quality of one’s intelligence and it is also fruitful procedure for finding out what a person is capable of doing. In short, intelligence test seeks to measure the strength, precision or
effectiveness of the preset operation of any mental activity. “Intelligence or the mental tests are instruments for measurement of individual abilities or types of behavior, with maximum emphasis on difference due to original nature rather than to training or environment”.

**Intelligence Test and Achievement Test**

Many a psychologist believes that there is partially no difference between Intelligence test and Achievement test. In favour of their assumption they put forward the thesis that both the tests depend upon knowledge or skill. There is some truth in their assumption because pure intelligence cannot be tested and all the intelligence tests depend upon some sort of knowledge or skill. But a serious student of psychology will not fall to discern the difference between an Intelligence test and an Achievement test. The former intends to discover the capacity if the individuals concerned. It means that the intelligence test do not bother about the use that has actually been made of natural abilities of the individuals concerned. To be more precise, the intelligence test tried to measure the inherent capacity of an individual or group of individuals, on the other hand Achievement test try to measure the actual achievement which the individuals concerned have made. To be more clear, Achievement test try to measure the products of training or education. They are intended to find out what use has actually been made of natural abilities of the individuals concerned.

But it is a fact that both are intimately related to each other because the aim of both is to measure the present efficiency of the individual.

In conclusion, we may say that the Intelligence tests do contain actual materials and it has not been possible to construct an Intelligence test absolutely free from knowledge and skill which have largely been learnt. The justification for the inclusion of factual items in an Intelligence test is that almost all the persons get the same opportunity in learning such facts and that the individual level of the individual concerned. But still it would be our endeavour to keep Intelligence tests free from factual material as far as practicable. Kelley and Cattell are of opinion that the correlation co-efficient between an Intelligence test and an Achievement test should remain between 40 and 60. It means that the factual knowledge and learnt skill should be kept at a minimum in a good Intelligence test.

**Types of Intelligence Test**

Intelligence tests are of various kinds. They are classified according to their respective aims and objectives.

(a) **Individual Intelligence Test (Verbal) or Individual test of general Intelligence**: This type of Intelligence test is most widely used by educators and psychologists. Verbal Individual Intelligence tests are modelled after the Binet-Simon test. This type of tests presuppose certain mastery of language. The new revised Standford-Binet test of Intelligence (Terman & Merrill’s
Revised M form Scale) is to-day the best known and most widely used individual test of general intelligence. Wickeel’s Intelligence test falls in this category though it is meant for the adult.

(b) **Group Tests of Intelligence (Verbal)**: There is certainly a difficulty in the use of Individual Intelligence tests widely. It requires enough money and time. To meet this problem, Group tests of intelligence have been evolved to take the place of individual Intelligence tests. This type of tests originated in America during the First World War (1914-18). The Army Alpha and the Army Beta Tests were developed for use in selecting Army recruits for officer’s training. Shortly after the war, Otis, Terman and others began to bring out Group Tests meant for schools and colleges. The Lorge Thorndike Intelligence Test is an example of this type of test. The army General Classification Tests (AGCT) also came under this category. It is needless to point out that these types of tests largely depends upon language. The advantage of group test is that it covers large number of candidates in a short time.

(c) **Non-verbal Intelligence Tests (Individual)**: There was a drawback in Intelligence Test (both individual and group), that most of the tests presuppose a certain mastery of language and naturally to those who have language difficulties tests like Binet-Simon are not fair. Hence, to obviate this difficulty non-verbal tests have been devised in which the examinees have to do something with their hands. Some psychologists claim that these tests give a fairer test of general intelligence. Pass-along Test, Form Board and other types of Performance Test belong to the category of Non-verbal Individual Intelligence Test. The so-called Paper-pencil Test also come under this type. The Kellogg-Morton Revised Beta Examination is an example of Non-verbal Individual Intelligence Test (Paper-pencil variety).

(d) **Non-verbal Group Intelligence Tests**: These types of tests require motor or manual rather than verbal response. In these tests language is required neither in administering them nor in responding to them. The Army Beta and the Detroit First Grade Intelligence Test belong to this category.

**Use of Intelligence Tests**

The importance of verbal Individual Intelligence Test (and Group) can never be over-estimated. These tests constitute the most accurate devices for the measurement of intelligence. These tests also help us understand the nature of the gradual developed of Intelligence.
This type of tests help in the classification of pupils in schools according to ability. They help in detecting mental deficiency or dullness, and for selection. The selection of applicant for college or professional school largely depends upon intelligence Tests.

Another use of Intelligence Tests in the field of educational guidance and vocational selection. The final practical use of Intelligence Tests is the measurement of the efficiency of educational institutions. Here, efficiency means the relationship between achievement and capacity.

**Limitations**

Opinions differ on the usefulness of Intelligence Tests. Some have shown fatalistic attitude towards mental tests. Intelligence test is a fetish to them. They think that intelligence test is the measuring rod of everything concerning main. It is the marvellous product of human ingenuity. A man’s future can only be determined by Intelligence tests and so it is the Intelligence test which predicts who will be what. But others are of the opinion that man the unknown, still remains unknown. It is not possible to know his inherent solely depends upon intelligence, Intelligence as we know, is only one of the traits of personality. Emotions, interests, temperament, attitude, sentiments are also important factors in one’s personality. The driving force of our action is not the intellect but the sum-total of personality traits. The sceptics laugh at the supposed utility of intelligence tests. To them these are childish, tinsel and sham.

We do not advocate outright rejection’ of intelligence tests. Intelligence tests do serve us in various ways. Intelligence test is also one of the methods of knowing a person’s innate quality. We measure innate, general cognitive efficiency of our school children by intelligence test. In the present state of our knowledge we do not know any better method of doing that important thing.

We do not question the usefulness of intelligence tests. On the other hand, we want to take some caution in the use of intelligence tests and in matters of their interpretations. It should be noted that there are many factors which influence a subject’s score in a given test and so one’s score in a particular time should not be regarded as a final one. Repetitions of the same test are necessary. Again, the result of an intelligence test is an imperfect one in the sense that it does not indicate how much of the score of an individual is due to his innate ability and how much us due to other factors. It is necessary to take particular care in interpreting test score. Lastly, it maybe said that mental test scores never be accepted in the same way as the physical measures are treated. So, intelligence tests should be used with caution and that they are not fool-proof should never be forgotten.

**The Structure of the Binet Scale of Intelligence**

From our every day experience, we find those who are good in one kind of activity are also good in other kinds of activities. For example, in the class-room a pupil good in Arithmetic is also good in, say English; he may not be equality good, but not usually bad.
From that we infer that there is fields. The layman says, his general intelligence plays its part. Among psychologists we find some people holding similar views. This general intelligence makes its expression through language, ideas or concepts. Binet of France, a psychologist, started with the help of a psychiatrist named Simon, the present practice of mental testing by putting a number of questions involving thought the observation so that the subject could give answers rather from the result of his own experience and reflection, than from what he learnt from schools or homes. Binet in 1905 arranged 30 simple items for testing some abnormal children of different ages. But the difficulty was that no mental grouping was possible.

In 1908 he devised another test consisting of 60 items retaining the 30 items of 1905 test. He also prepared Mental Age grouping test of 3 to 13 years old. This test was standardized on an examination of 200 poor children of Paris. In 1911 he made another revision. In this revision he transferred some tests from one group of age to another. Binet Tests and Terman puts it believed that in intelligence three factors are involved- a tendency to take and maintain; the capacity to make adoption for the purpose of attaining a desired end; the power of auto-criticism. Binet devised intelligence scale but he did not understand intelligence very clearly. He introduced the concept of mental age. He got the age norms for a given test by giving the test to a representative group of appropriate age range, dividing the total group into smaller groups of appropriate age range, dividing the total group into smaller groups on the basis of age, and computing the average score for each succeeding age group. Usually, such groups are divided by month intervals.

**Limitation of Binet-Simon Test**

The Binet-Simon Test formed the basis of numerous other rests conducted in America, England and Germany. The Binet-Simon tests underwent important modification and revision. Why did the need for this modification arise at all? First, Binet applied his tests upon poor Parisian children. This may not be familiar to all children, so it may not be followed by one and all. It means Binet did not care to take sufficient care to standardize his test. Secondly, Binet Tests depend on scholastic ability. Lastly, it is very difficult to understand what Binet wanted to measure. His tests lack in clear objective. But it is no denying the fact that Binet laid the foundation of modern mental testing programme. There is a good correlation between Binet’s intelligence test and Scholastic attainment Test and for diagnosis of mental deficiency it is a good test no doubt.

Binet Tests were not only tests but schemes and accordingly some prominent Psychologists have offered modifications of the original Binet-Simon test. *New Revised Standford-Binet Test of Intelligence* (Revised by Terman and Merrill in 1937) is to-day the best known and most widely used individual test of general intelligence. This test is also called Terman Merrill Tests. It should be noted that most of the modern verbal individual, intelligence tests include performance tests as well as tests depending largely on language.
The essential tasks of the farmers of the Revised Binet-Simon Test were the following:

(a) They had to modify their tests according to the children of the place.
(b) Immediate change in the age assignment of the test was made.
(c) Too easy at the lower end of the test, difficult at the higher end. Even some items of Binet-Simon Test was rejected because they were of lower validity.
(d) Different mental age scale and point scale have been introduced and partial credit system was introduced.

Some Examples of Individual Intelligence Tests

3 years old child. (Binet-Simon)
(a) Ask to show nose, eyes, mouth etc.
(b) Repeating two digits numbers.
(c) Naming own sex.
(d) Surname.
(e) Naming simple objects as knife, key etc.
(f) Describing pictures.

Items Illustrating the 1960 Revision (L. M. form) of the Standford-Binet Intelligence Scale Year II:

(a) Three-hole form board (place forms in holes),
(b) Delayed responses (finds toy animal after it has been hidden)
(c) Identifying parts of the body (indicates named parts on doll)
(d) Block-building : Tower (builds tower model after demonstration).
(e) Picture Vocabulary (names common objects while looking at pictures of them).
(f) Word-combination (spontaneous word-combinations made by child during the session are noted).

The General Procedure in Administering the New Stanford-Binet Test (M. form Scale)

The object should be made to sit comfortably in a room free from noise and distraction. The test materials should be properly arranged in order for presentation. A friendly attitude should be maintained between examiner and the examinee. In course of getting his acquaintance, the examiner and the examinee. In course of getting his acquaintance, the examiner may elicit some of the examinees liking so that in order to get better response, the examiner may fit into the examinee’s liking. By this way subject’s name, age and class he reads position in the family are ascertained. In short, the examiner is directed to make
sure that the subject understands what is to be done and in all cases the burden of proof is with the examiner to show that the examinee has responded in a way that is representative of his ability. So this apparently useless part of work establishes a thorough rapport with the subject which is the essential prerequisite of an intelligence test.

After rapport has been established, the examiner will give directions to the subjects in most intelligible, lucid and unambiguous form. In between tests of different age levels, the subject should be allowed to take rest for a while.

If the subject is successful on all tests at one level, the examiner passes on to the higher levels and continues on through the scale until the subject fails to answer all tests at one age level. To be more clear, if a child of six passes all the 6 items of 5 years age level is to be administered. If he passes all the items of 6 years age level, further upward tests are to be given.

The child’s mental age is determined by giving him credit for the number of years below the level on which e passes all tests. As for example, if he answers all the items relating to six years age level then his basal mental age will be 6 years. He will add to this amount the years and months of credit assigned to the higher level tests he passes.

Let us take an example for making it more clear.

Ram is a child of 6 years old. His parents want to know his Intelligence Quotient. In order to get this they seek help from a psychologist. Now the question arises - how the psychologist will determine the I.Q. of the boy - the psychologist will determine the I.Q. by Terman and Merril revised M from scale. He will follow the procedure noted above.

The psychologist will try to learn from school record and also from by way of conversation from the boy the actual age, which is called chronological age of the boy. After satisfying himself that the boy is of 6 years old, the psychologist will administer the test relating to 5 years age level, that is, tests of an age level prior to the chronological age of the boy. So the 5 is the age level to start with. As the boy passes all the 6 items easily, the test relating to 6 years age level is administered. Here also the boy test items correctly. So the age level pertaining to this age level is taken to be the basal mental age of the boy. Now considering that the boy can answer questions pertaining to advanced age level and hence may credit higher mental age, further upward tests are given: hence may credit higher mental age, further upward tests are given:

(a) Age level VII  6 items the boy passes in 4
(b) Age level VIII  6 items the boy passes in 4
(c) Age level IX   6 items the boy fails to respond any.

Scoring: The age level to begin with in this experiment is 6. Hence 6 is the basal age of the boy. And the final age after which the boy fails to answer any question is the final age level reached. Now considering the scoring standards of age level 6. 7. 8 and 9 the boy’s score is tabulated.
Calculation of I. Q: Intelligence Quotient (I.Q.) denotes a quantitative measure of human intelligence. Prof. Stern of Germany evolved this system and thereby revolutionized the Mental Testing programme. The I.Q. is easy to calculate and very convenient to refer to even in popular expositions; and is derived by dividing a person’s mental age by his chronological age (\(\frac{M.A.}{C.A.}\)) and multiplying the result by 100 (\(\frac{M.A.}{C.A.} \times 100\)).

Then the I.Q. of this boy of 6 years with a mental age of 7 years 2 months has

\[
\text{I.Q.} = \frac{86 \text{ months}}{72 \text{ months}} \times 100 = 119, \text{ an I.Q. of 119 (approx.).}
\]

Idiots: All persons do not possess equal intelligence. Individual difference in innate ability is a fact which nobody can deny. But it is also a patent fact that every man possesses intelligence, high or low. The persons with an I.Q. below 20 are termed as idiots-’the idiot never learns to communicate with his kind by speech’. Though Merrill has dubbed all the persons with I.Q. below 50 as feeble minded, it has been found later that idiots possess lowest I.Q. among the human specie. It means that the mental age of the idiots remains constant irrespective of the change in their chronological age. Throughout their lives, the idiots remain absolutely dependent upon others. But some of them can walk and take their meals with their own hands.

Imbecile: The imbeciles are placed just above the idiots as possessors of intelligence. They can neither express their thoughts in writing nor understand what they read. They cannot solve any problem with which they might beset. Of course, they can do easy jobs.

Moron: Individuals with an I.Q. ranging from 50 to 70 are called morons. They can complete much of the ordinary work done by normal children if they are given particular attention in schools. But they cannot keep pace with the normal children in the educational journey. Hence special classes should be organized for them. They can also learn some rudimentary skills.
I.Q. Intelligence Quotient denotes a quantitative measure of human intelligence. Intelligence has been generally conceived to be a composite organization of abilities to learn, to grasp broad and subtle facts, specially abstract facts, with alertness and accuracy, to exercise mental control and to display flexibility and sagacity in seeking the solution of problems. This highly abstract mental ability is quantitatively expressed in the form of a ratio. This ratio is arrived at from the mental age obtained from a number of standardized questions divided by chronological age (MA / CA). In order to avoid any fraction the ratio is multiplied by 100 which ultimately forms the respective I.Q. or the quantitative measure of intelligence. If we assume that differences in intellectual maturity constitute a means of measuring differences in intellectual capacity or brightness then I.Q. may be regarded as a measure of brightness.

Intelligence and Memory: It is popularly believed that memory and intelligence are closely related. It means that intelligent persons can as a rule learn and remember better than dull persons. This belief made the use of immediate memory tests in most of the intelligence scales. The belief has also been corroborated by psychological findings to a great extent.

Memory involves mental organization. This organizational aspect is most prominent in logical memory. And it is the aspect of memory which contributes the basis of its correlation with intelligence.
MECHANISM OF LEARNING

Education is a process of life and life is a process of growth. But education is concerned more with development than with growth. Growth implies addition, while development implies some desirable elimination also. So what development refers is based on our experiences. Experiences are our reactions or responses to our environment. We are born with some instinctive reaction. These are modified by our experiences. The amount of modification on our relations in a past experience is evident in our present experience of same kind. Finally we select the effective reactions for our successful adjustment and improve upon them. The whole process, of bringing change and modification to our development is called the learning process, select the effective reactions for our successful adjustment and improve upon them. The whole process of bringing change and modification to our development is called the learning process.

We learn not only reading, writing and some skills but various other activities, some patterns of behavior also. The major part of our behavior is the result of learning. We learn knowledge, information, language, social rules and regulations through the different sense organs or through the process of memorization. Learning includes both acquisition and retention. Acquisition refers to the cumulative effect of training while the sustained effects are retained. Progress in successive training depends on the retention of the effect of previous training.

Subject matter of learning - We learn not only reading, writing and some such other skills but various other activities and patterns of behavior also. The major portion of our behavior is the result of learning. When a process of learning is continued for a long time, some patterns of behavior are fixed as habits. We learn habits including the modified inherited reactions. Habits are the results of learning. We learn many skill, necessary specially in the fields of vocations. We learn knowledge, information, language, social rules and orders through the different sense organs or through the process of memorization. Learning includes both acquisition and retention. Acquisition refers to the cumulative effects of training while the sustained. Progress in successive training depends on the retention of the effects of previous training.

In learning the perceptual and motor skills like walking, talking, manipulating objects, attaining the sense of differences between objects, instruction of supervision is not an influencing factor. The child can often learn very well with little or no instruction. In conceptual learning of rules, definitions, written language, science, mathematics etc., instruction is greatly necessary.
**INTRODUCING EDUCATION**

*Ways of Learning* - Our whole field of learning may be brought under three ways of learning. One of these three is actually not our learning. It refers to our inherited instinctive behavior, which our ancestors learned, if at all it was necessary. Another way of our learning is under direct instructions of the teachers or supervision of the adult members of the society. Various school subjects and other skills in arts and crafts, are learnt in this way. Lastly we learn the manners and customs of the society and other was of social life without any direct instruction. We learn these things of our own record mostly by imitation, conscious or unconscious.

**Learning by Imitation**

Human beings consciously or unconsciously, imitate the actions, manners, style and ways of their fellow beings. A child learns to talk, to wear his coat, to lace his shoes, to sit in very much the same manner as his parents or brothers do. It is very important, therefore, that the first model should be worthy of limitation.

A child’s personality and, to a large extent, an adult’s is fashioned in part through imitation. It means that many modes of adjustment are taken over by the imitator from other persons who serve as models for conduct. Learning by imitation received so much emphasis that instinct of imitation was recognized as the only medium for the acquisition of all mental and skill learning. But this view has been changed now. And three different processes, all imitative in their effect, have been accepted.

**Imitation and Child’s Development - The First Stage**

The first is a kind of imitation which is found very early in the child’s development. It is significant chiefly in the first year of life. The child adopts the first forms (bye-bye, Ta-ta etc.) as well as many gestures. This may be called the organic imitation.

A second early forms of imitation is the imitation of action which interest the child he watches with great attention (putting of his father’s smoking or hiding his face in a newspaper and start muttering in imitation of his father or elder brother).

Now follows the imitation of action seen in a picture or heard described in a story. All these type of imitation occur in later childhood and sometimes in adults. The unconscious imitation or local accents in speech is a case in point. The deliberate copying of others becomes a more and more important factor in the growing personality especially, in adoption or prejudices, belief and attitudes of one’s fellow beings.

Imitation is of great importance in the school and college-room. In learning drawing, music, mode of delivering lectures, playing games and several other forms of skillful activity pupils try to follow the manner of their teachers.

Imitation is one of the most fundamental and important means of learning. “Only the imitative individual is capable of learning and the most imitative is the most educable ‘Our customs,
ideals, modes of thought and behavior and entire culture are conserved through imitation. We get a common basis of customs, ideas and language from it. Imitation does never crush originality, on the other hand, it is the first stage in the development of individuality “and the richer the scope for imitation the richer the developed individual will be”. Even great people have to imitate others before they can contribute their own to this store-house of knowledge. The word ‘originality’ is a misnomer.

It should be noted that there is an element of choice and pleasantness in every act of imitation. There are thousand and one imitable acts but each one of us chooses only few of these for imitation and neglects others. So there is an element of personal preference and originally in every choice. Again no imitation is a carbon copy of thing imitated.

We learn many things by imitation. Children and higher animals are found to learn mostly by imitation. The children are subject to imitation is of course a good way of learning. Though most of our unschooled and uncultured people learn by imitation, with maturity the tendency decreases. The children learn the skills in natural habits like speaking, walking etc, by spontaneous unconscious imitation. Imitation is deliberate when one imitates some skills with predetermined goal. It is necessary in learning reading, writing, drawing, dancing etc. Spontaneous imitation facilities growth and deliberate imitation, learning imitation and adult guidance together help the learning process. In the educational environment the children should find scope for imitation. But by no means imitation should be compelled. Then it tends to defeatist purpose. Mere imitation is not sufficient, because there are things which are’ not possible to be learnt by imitation. It cannot be an exclusive process of human learning.

**Mechanism of Learning**

Mechanism of learning means ways of learning. Psychologists have generally agreed on the point that there are three ways or methods of learning. These are (a) Conditioning, (b) Problem solving, (c) Trial and error.

**The Conditioned Response Theory of Learning**

Salivation is the natural response to food when it comes in contact with the tongue. This response is immediate and does not require any interference of consciousness or will. It may thus be called a reflex action. But it is also noted that animals salivate not only to food, but also in response to the sight or flavor of the food; This phenomenon fascinated Pavlov, the great Russian Physiologist, and as a consequence he devised a series of experiments to determine the conditions under which it occurred. As a result of successful experiments a very important and valuable principle of learning has been established.

To establish a connection between a response, like salivation, and an initially stimulus, like the sounding of a belt. Pavlov found that it was essential to pair the presentation of the new stimulus with the original stimulus. The bell, for example, was sounded at the time was presented to the dog or just before. The dog was found to salivate in response to the
sound of the bell. The response which was thus learned was called by Pavlov a conditioned reflex. The term conditioned reflex was first used by Pavlov. But as in many cases the response is not a reflex action. The modern physiologists prefer using the term “conditioned response” or CR. In brief. The natural stimulus is called unconditional stimulus (U.S.) the natural response is called unconditioned response (U.R.) and the artificial or substitute stimulus is called conditioned stimulus (C.S.).

In Pavlov’s laboratory, food was the original or unconditioned stimulus and salivation was the unconditioned response. The sound of the bell was the conditioned stimulus. After a number of trials the sound of the bell alone elicited the response, viz. salivation. Salivation in response to the sound of the bell, which was not its natural stimulus, was called conditioned response. The dog was found to salivate to the sound of the bell though no food was given. This conditioned response would be reinforced by repeating the pairing of the conditioned and unconditioned stimuli. It was also found that the conditioned response might be extinguished by presenting only the conditioned stimulus without its being followed-by the unconditioned stimulus. The dog no longer salivated at the sound of the bell after the bell had been rung a certain number of times without food following-it. But such extinction of conditioned responses are not permanent. They can be re-established by sounding the bell and presenting food immediately after for a number of times. This is called spontaneous recovery.

This fact of conditioning an animal to respond to an artificial stimulus is known as Positive conditioning. There is also its opposite phenomenon known as Negative conditioning which means that the animal learns to neglect stimulus if it is not found to be followed by the desired consequence.

It has also been ascertained experimentally that the natural response to a natural stimulus may be inhibited or arrested by habit and training. The horses and mules that are used to carry food to the war front are trained to remain quiet in the midst of the loud sounds of bombs. The natural reaction of these animals to such sources is to startle and run away. Whenever they try to escape, from the battle-field. This negative conditioning will be more firmly established if they are rewarded by good food when they do not show startle-reaction.

It is evident that this process of conditioning is a potent factor to reckon with the field of learning.

According to Pavlov, all learning is conditioning-reconditioning. The driver stops his vehicle at red light and starts at green light. This is not natural response. He had to became conditioned so that he might put the brakes upon his vehicle as soon as he saw the red signal without any prior thought. He knows that failure to do this is sure to be followed by punishment. The child has also to learn things in this way. As soon as the teacher steps into the class-room, the child has to stand up. Such conditioning is a must in learning. Then
again the bad habits, wrong responses etc., of the child have to be removed by the teacher or by the parents by the process of recondition. Pavlov thought that “different kinds of habits based on training, education and discipline of any sort are nothing but a long chains of conditioned reflexes”.

The Behaviourists use this concept of conditioning and Pavlov’s physiological explanation to explain all forms of learning. Bachtetev and subsequently Watson concluded conditioning experiments with human subjects and all these experiments have shown results similar to those of Pavlov with his animals. A number of fears that children have are acquired through the process of conditioning. This has been experimentally demonstrated by Watson, the chief exponent of the Behaviouristic school. A nine-month old baby, Albert, had no fear of rats, rabbits, balls of cotton wool. Now a rat was brought before him and as he approached to touch it, a sudden loud sound was made by striking a mental .bar before him. Albert showed signs of fear and startled-reaction. This procedure was repeated a number of times as a result of which conditioning was established and Albert showed signs of fear at the presentation of a rat and he also cried. Watson also showed that acquired fears can be removed b % negative conditioning.

According to Pavlov and Watson all kinds of learning take place through conditioning of responses. Learning progresses through changes in conditioned stimuli and responses and conditioning new responses to new stimuli. The child is born with inborn and uncontrolled reflex action and reactions. Within a short time, these reflexes begin to be controlled in various ways. Conditioned behaviours and transformed into habits through practice and exercise. Initially, the child’s education is nothing but conditioned responses. Conditioning of responses is not found in equal measure in all cases. Those who are mentally strong find it easier to condition the nervous system and establish new bonds. Conditioned response has been called the primary learning process. It is considered to play an important part in the field of education. It has a role in the child’s learning of language. Many of the behaviours of the child are created through conditioning. The word ‘conditioning’ is used in a very wide sense. All forms of education have been included in it. Even the process of brainwashing, adopted in particular cases in socialist states. All forms of education have been included in it. Even the process of brainwashing adopted in particular cases in socialist states, fall within just scope, We, however, take the word conditioning to mean acquisition of artificial behavior, Pavlov thought that ‘different kinds of habits based on training, education and discipline of any sort are nothing but a long chain of conditioned reflexes’. Later investigations have shown that this theory of Pavlov, is not correct. Many psychologists, however, still believe that the process of conditioned responses is important in the field of education.

It is not possible to say what exactly is the manner in which education works. We can form our ideas about it from the effect. The reason is that the nervous system and the learning
process are too complex to be clearly and completely understood. An observation of the conditioned responses helps us form an idea about the process of education. The conditioned responses can be found in various experiences during childhood.

It is the process of conditioned response which helps in finding the symptoms of mental disorders like schizophrenia, paranoia, manic depression etc. It is also useful in checking undesirable habits in children like bed-wetting till a late age, unreasonable fear, finger sucking and biting nails etc. It is also helpful in assessing the mental level of children, the mentally retarded and the abnormal. The process also makes it the teaching of some school subjects like arithmetic, spelling etc, easier. The method of conditioned response, is however, not the only method in the field of education.

**Classical and Operant Conditioning**

Normally, we react differently to different stimuli. Each stimulus has its special response or relation. Pavlov was the first to inquire into the nature of reflex actions and tried to ascertain whether the special response to a particular stimulus may be invoked by an alternative stimulus. Conditioned response or Respondent conditioning is also called classical or Pavlovian conditioning because it was first fully explored and described by LP. Pavlov during a series of experiments on the salivation reflex in dogs.

**Operant Conditioning**

In operant conditioning, also called instrumental learning, learning is basically a process of selection out of initial, crude, unlearned behavior, responses that are precisely and economically effective in the specific situation.

The theory of operant conditioning is associated with the name of Prof. Skinner. He put forward this theory on the basis of his experiments on learning in animals. His experiments have broad and important implications for human learning. Certain definite principles have emerged out of his studies which characterize quite nicely the way in which human beings form new associations and learn new things.

**Experiment**

Inside a specially constructed ‘Puzzle box’ called ‘Skinner box’ a hungry animal is placed. The box is built in such a way that it will get a piece of fish or meat every time by depressing a lever which is attached to the cage. Inside the cage a lever, a plate for eating food and some mechanical arrangements for activating the animal are kept. Some pieces of fish or meat are kept outside the box so that hungry animal, in the experiment would get a piece of food every time it depresses the lever.

First, the animal was sufficiently motivated or stimulated to go into action by an external stimulus say sounding of a bell or lighting up a small electric bulb inside the box. The animal in its attempt at getting the food made some movements and in this process depressed the
lever and with it a piece of fish automatically fell into the pot kept inside the cage. The animal ate it with relish. Elated by the occurrence it depressed the lever again, and the same thing was repeated. In the same manner, the experiment was continued. Skinner noted that as the number of trials increased conditioning between depressing of the lever and getting of food was effected in the animal.

**Difference between Pavlov’s Theory of Conditioning and Skinner’s Operant Conditioning**

In Pavlov’s experiment food was the original or unconditioned stimulus and salivation was the unconditioned response. The sound of the bell was the conditional stimulus. After a number of trials the sound of the bell alone elicited the response viz, salivation. Salivation in response to the sound of the bell, which was not its natural stimulus, was called conditioned response.

In Skinner’s experiment the unconditioned stimulus did not create the conditioned response viz, the depressing of the lever, which was the central theme in Pavlov’s experiment. In Skinner’s experiment just the opposite happened. Here the conditioned response (depressing of the lever) controlled the unconditioned stimulus (food). And for this reason it is called operant conditioning. As the depressing of the lever caused the presentation of the food so the lever may be described as an instrument and such type of behavior may be called Instrumental act.

The conditioned response theory of Pavlov is mechanical. It has no place for the will, attention and interest of the learner. Skinner’s theory fares better than Pavlov’s. Skinner accepted both the law of exercise and the law of effect. The animals learned to depress the lever because it is connected with satisfying states. Learning here is intimately related to the needs of an animal and the animal easily learns those items that can fulfill those needs. Human learning is more complex than animal response method (conditioned response). But human learning is not limited to it. Man makes use of language. His different responses to different stimuli are also complex. To man, learning does not mean mere establishment of relationship between a stimulus and a response but the development of a method for dealing with his many-sided problems. The method of operant conditioning plays important part in human learning. It agrees on the importance of the freedom of the learner also. The learner’s reaction is not controlled by the stimulus, but by the environmental condition prevailing at the time.

**The Theory of Learning by Insight or Theory of Problem-Solving**

According to the Gestalt psychology, every kind of experience is a unique whole or a gestalt. Whenever we perceive something, we perceive it is an organized whole or unit, and not as a mere sum or aggregate of parts. The object of perception is always a whole, a gestalt. The perception of a gestalt, again, exists as a figure against a more general and vaguer background and assumes its particular form against that background.
The Gestalt psychologists subjected Thorndike’s theory of learning by trial-and-error to severe criticism. Kohler and Koffka, the two founders of the Gestalt school, argued that learning was not a blind and mechanical process. It involves an insight into the field or total situation. The way in which an organism adapts itself to changed environment is not mechanical. The correct adaptation requires understanding of the total situation. When an animal is placed in a new environment, it learns the situation by insight, and not by mechanical trial and error method. Insight means an understanding of the whole situation which is necessary for the animal to learn a new movement for mastering a new situation. Gestalt psychology has laid special stress on the role of insight in learning.

**Learning by Insight**

In one very interesting and illuminating experiment, Kohler put a chimpanzee, Sultan, whom he thought to be the most intelligent than others, inside a cage and a bunch of banana was kept outside. Inside the cage were two sticks—one longer and the other shorter. One stick was hollow at one end so that the other stick could be thrust into it to form a long stick. The banana was so placed that neither of the sticks could reach it. But if the two sticks were joined, the banana could be reached. The chimpanzee tried various means of reaching the banana and made many unsuccessful movements. At last as the animal was no closer to solution, the experimenter gave him a hint by thrusting one finger into the opening of the larger stick directly before the eyes of the animal. But this clue failed to help the chimpanzee. After an hour or so of futile attempts, the chimpanzee apparently gave up the task. He, however, continued playing with the two sticks and after some manipulation, holding one stick in the left hand and the other in the right hand he accidentally got them together and with this long stick he pulled objects as stones that lay within reaching distance. On the following day after making only a few desultory attempts, Sultan quickly joined the two sticks and got the banana.

**Criticism**

Gestaltists have called this insight learning. This can be understood by analyzing the above experiment. Sultan definitely did not learn to pull the banana by repeating aimless trials and errors. Learning, as it were, flashed upon his mind to make the total situation clear. And as soon as the total picture was clear to him he gained insight, which showed him the way.

According to the Gestaltists, learning is not a mechanical process. Man get insight into the ways of adapting himself to a new situation by looking at the situation as a whole. Therefore the whole is not only the sum of the different parts but something more than that. A sentence is more than the whole and grammatical construction in it. The words in the sentence in relation to each other produce a complete sense. On the other hand pattern or form is an attribute of the mind. Due to power of cohesion all our experiences combing together and form a new whole. So knowledge does not come from the sum of the sensations produced by the stimuli in the situation but from the insight into the form or the pattern.
Insight arises from an attempt to solve problem. Solution is the purpose. But there may be some obstacles. So the nature of the problem depend upon the agent-goal-obstacle relationship where the agent is the learner himself. The gaps in the new situation makes him restless, until the dawning of insight which helps complete the gap.

Learning by insight may also be called ‘learning by observation’. In such learning, the solution is reached suddenly in a moment, without loss of time or energy. This has definitely a special utility in human learning. The problem and the solution are understood together. In this method the whole situation of learning lies open before the student, who has a clear idea about his aim. He can understand the mutual relations among the different parts of a problem, leading to the dawn of insight. In problem-solving, the whole solution appears before one’s eyes.

It must, however, be kept in mind that trial and error have their role in learning ‘y insight also. Many authors do not accept learning by insight and have spoken, instead, of foresight and hind sight. In problems requiring the use of machines, however, learning is possible only by insight. For, the solution come into sight together and the student can learn easily. There cannot, therefore, be a wholly mechanical explanation of learning.

**Trial and Error Learning**

Learning is an almost ubiquitous process. From the general behaviour of organism at one end to the behavior of the human adult at me other, learning takes place in some form or the other. A number of theories have been put forward regarding the learning process. It must, however, be kept in mind that the difference between simple and complex learning is one of degree only.

**Thorndike’s Trial and Error Theory of Learning**

The eminent American psychologist E.L. Thorndike, attempted to find out the simple laws of learning by conducting experiments on animal learning, realizing the difficulties of finding out these laws from the complex human behavior. Certain definite principles have emerged out of his studies which characterized quite nicely the way in which children and adults form new associations and learn new things.

**Experiments on Animal learning**

Thorndike conducted several experiments on animal learning with cats. Inside a specially constructed “cage” or “puzzle box” or ‘maze’ a hungry cat is placed. The box is built in such a way that its door can be opened by lifting a latch or pulling a wire loop or depressing a lever. A piece of fish is kept outside the box, so that the hungry cat, in the experiment, would be sufficiently motivated to go into action. The cat in its attempt at coming outside to get at the food makes random movements. It squeezes through any opening, it claws and bites at the bars. In the course of some random and impulsive hit-or-miss efforts to escape
from the box, the cat, by sheer chance, handles the lever or the loop which opens the door. The cat comes out and is allowed to have nimble at the food. It is again taken and put inside the box. In this second trial also the cat makes all those random movement. In the same manner, the experiment is continued. Thorndike noted that as the number of trials increased, the unnecessary and irrelevant movements of the cat were reduced in number, until finally, when the cat was put inside the box, it went straight to the lever or the loop, clawed it and come out. This experiment led Thorndike came to the conclusion that the cat learns not by intelligence or insight but by repeated attempts and errors.

Thorndike thinks that the above experiment is applicable to human learning also. In his opinion man also learns through repeated attempts and errors. Learning takes place through the establishment of the right connection between stimulus and response. When man shows new behaviours in novel situations. It must be taken that he has established the right and new connections between stimuli and responses. If a child laughs at the sight of and jumps into the arms of the man of whom it was afraid previously, the reason is that the relation of fear with the man has been replaced by a new relation. The hungry child cries and attracts the mother’s attention, and thus finds a connection between crying and the pleasant situation of having the mother’s attention. The child, therefore, cries whenever it wants to attract its mother’s attention. Similarly, if a response creates an unpleasant situation, the link will be broken. Thorndike says, “learning is the establishment of bonds between stimulus and response and it follows mechanical process of blind trial and error”. The child, the student, the adult all learn more or less through trial and error. It is through repeated errors that the child learns drinking milk with a spoon, or walking or running or putting on its shoes. Similarly when an adult learns to ride a cycle, to drive a car or to play cricket, he acquires success through repeated errors. The trial and error method, although commonly followed in a variety of learning, is very time-consuming and uneconomic. It is aimless, painful and slow. If learning takes place by this method it entails a great amount of wastage of time and energy. It is definitely of a lower level than other methods of learning. It must, however, be admitted that much of the progress of human civilization, particularly our industrial civilization, depends on this method.

BASIC LAWS OF LEARNING

(1) The Law of Effect

Learning occurs if and only if the response has some effect on the environment. The law of effect maintains that when modifiable connection between stimulus response (S-R) has been made, it was strengthened if it resulted in satisfaction and was weakened if it led to annoyance. But later on in 1932 E.L. Thorndike modified his earlier law of effect as “that satisfaction strengthens the bond but annoyance does not weaken it. “The law of effect had been under criticism by psychologists who complained that the law of effect has the
flavor of the principle of hedonism using satisfier and annoyer. Thorndike tried to respond the criticism by defining the terms in an objective way; “By a satisfying state of affairs is meant one which the animal does nothing to avoid, often doing things which maintain or renew it. By an annoying state of affairs is meant one which the animal does nothing to preserve, often doing things which put an end to it.”

Class-room Application of the Law of Effect

The teacher can use this law in the class-room learning - teaching situations in the following ways:

(a) The class-room experiences should be satisfactory and pleasant. The teacher must enjoy his teaching work.

(b) Learning experiences and other activities must be meaningful and understandable in terms of the personal life of the learners.

(c) School experiences and activities must be arranged in such a way that learners may have some degree of confidence and success in their work.

(d) School activities should be organized in increasing difficulty order so that the students may progress without any failure.

(e) Material should be provided in varied ways so that novelty may be maintained.

(f) Guidance, praise and encouragement that give pleasure and satisfaction of knowing that he is on the right path, should be properly used.

(1) The Law of Exercise

The second law is divided into two parts as:

(a) Law of use, (b) Law of disuse.

The law of use states that other things being equal, the more frequently a modifiable connection between stimulus-response (S-R) is made, the stronger that connection will be. The law of disuses states that other things being equal, when a modifiable connection between stimulus-response (S.R) is not made over a period of time, the strength of that connection is weakened.

Application in Class-room Learning

(1) More and more opportunities should be given to the students to use and repeat the knowledge they get in the class.

(2) To maintain the connections for longer period, review of the learned material is necessary.
(3) Drill strengthens the bondage between S-R. Drill plays an important role in elementary classes in the learning of multiplication tables, alphabets and meanings of words. According to Thorndike more and more drill should be given in elementary classes to strengthen the bondage between stimulus-response.

(2) The Law of Readiness

When a modifiable connection is ready to act to do so is satisfying, where it is not ready to do so is unsatisfying. Readiness is dependent upon both maturation and experience of the learner.

Class-room Implication

(1) Teacher must wait till learner is ready to learn and should give those experiences which help to enhance readiness. Preparatory experiences that will hasten the growth of readiness can be provided in primary classes.

(2) Aptitude tests in various subjects may be given to determine the thoroughness of learners.
STATISTICS IN EDUCATION

An introduction to statistics which utilizes data, applications, and interpretations in one’s own field is undoubtedly easier and more efficient that the alternative of learning methods as applied in another field and then transferring the procedure to one’s own.

Lord Kelvin advocated “when you can measure what you are speaking about, they express it in numbers you know something about it, but when you cannot measure it in numbers, your knowledge is of meager and unsatisfactory kind.”

SCIENCE OF STATISTICS

Lovit had rightly mentioned “Statistics is the science which deals with the collection, classification and tabulation of numerical facts as the basis of explanation, description and comparison of phenomena.”

Sutcliffe said “Statistics comprises the collection tabulation, presentation and analysis of an aggregate of fact, collecting in a methodological manner, without bias and related to a predetermined purpose.”

According to Tata “Statistics as a tool in research, deals with the methods of collecting and interpreting numerical fact.”

Some clinical psychologists are members of university faculties, where they spend their time teaching and doing research, but most clinicians are either employed by agencies concerned with the treatment of mental disorders and behavioural problems or are employed in private clinical practice. In short, most clinical psychologists are concerned with helping people. Of what possible value could a number of course in statistics and research methods to a person who intends only to help people, and who has no intention of doing any research beyond whatever may be required to earn an advanced degree? And perhaps more to the point, what about the undergraduate student who has no intention of becoming a professional psychologist? Why should course such as the one you are presently taking be required for all psychology majors? The answer to these questions are straightforward: Every professional psychologist and every psychology student as well is a consumer of research, though not always a producer, and to be an intelligent, critical consumer of research findings requires some knowledge and appreciation of how such findings are generated. We are swimming - if not drowning - in a flood of research findings from every field of science some of which may have implications stretching beyond our imagination.
As we will see, the facts do not always speak for themselves, but rather may require a considerable amount of interpretation. It behooves every thinking person to acquire some of the tools which are necessary for the critical interpretation of research findings.

A parameter is any measure based upon an entire population. Parameters are perhaps more widely known as “true: measures. For example, a true mean, which is parameter, is the mean of all members of the population. A statistics is any measure derived from a sample, and is frequently referred to as an “obtained” measure, or as an “observed” measure. A parameter always has an exact constant value, although usually unknown: a statistics varies in value from sample to sample. Parameters are seldom determinable, since usually the entire population is not accessible; in most instances, the best we can do is to estimate the parameter by drawing a sample and calculating the corresponding statistic.

Descriptive Statistics

The first function of statistics in the service of research is to afford condensed and summarized descriptions of units with regard to enumerable or measurable characteristics. We call the statistical methods by which this function is achieved as simple descriptive statistics of descriptive statistics. The measures usually used in descriptive statistics are ratios, rates, percentages, frequency distributions, measures of central tendency and measures of dispersion. These summarizing measures condense masses of unwidely data into forms which supply information efficiently. Often detailed data on numerous items may be distilled by statistical analysis into one or two summarizing measures which retain all the essential information. This makes it possible to comprehend more easily certain aspects of the materials and also to convey the information to other easily.

Inductive Statistics

Because of practical considerations a scientific inquiry must often be limited to the study of only a small fraction of the items in which we are interested when this is the case, limited number of units a sample is chosen from the entire series of the universe. The method of choosing a sample for study must be carefully planned in order that the sample is chosen from the entire series of the universe. The method of choosing a sample is chosen from the entire series of the universe. The method of choosing a sample for study must be carefully planned in order that the sample will be representative of the universe, with respect to the characteristic or characteristics being investigated. For analyzing data gathered from a representative sample of units, we have, in addition to the descriptive statistics which afford a summary description of the sample itself, a more elaborate body of methods which permits us to make certain estimates and to draw certain conclusions about the larger group from which the sample has been drawn. The statistics method used in this inductive function may be called inductive statistics.
We still make extensive use of qualitative descriptions, such as our categories of mental disorders - schizophrenia, manic-depressive psychosis, and so on - but as the study of behavior has progressed, descriptions have tended to become more and more quantitative. For example, counting the number of hallucinations a psychotic behavior. Changes in the number of reported hallucinations may provide a rather fine-grained description of a psychotic’s behavior during the course of therapy. A declining frequency of such reports would indicate at the very least a quantitative change in behavior though not necessarily a decrease in the hallucinations themselves.

We often describe people as bright, dull or average when we observe them in situations where we suppose intelligent behavior is required. Broad classifications of this sort have proven useful, since we can predict to some extent people who show intelligent behavior in one situation, perhaps in school, will tend to do so in other similar situations. For example, a bright student who handles numbers well in school would be more likely to be a successful accountant than a student who has chronic troubles with addition and subtraction.

Using only three descriptive categories - bright, dull, and average represents a very coarse kind of classification. There may be great differences between people near the top of the average category and people near the bottom of category. We might improve our prediction by dividing our very broad categories into narrower ones - for example, very bright and fairly bright, high average and low average, and so on. We could make our categories narrower still by attaching numbers to the students, based on their grades or on their performance on various standardized tests, such as scholastic aptitude, achievement, and IQ test. Using numbers provides us with very fine-grained descriptions of behavior, and the better our descriptions, the better predictions we can make, and the greater our progress toward understanding behavior. There is a very strong historical trend toward greater use of quantitative measurements in all of the sciences, and psychology is no exception in this respect.

Displaying Frequency Distribution

A frequency distribution can be presented in the form of a table or as a graph. Each kind of presentation has its own advantages, which we will point out shortly.

Histograms. The tally column in Table provides a kind of graphical representation of the frequency distribution, since each mark stands for one individual score, but the histogram in Figure 4 provides a better pictorial presentation. The scores are located on the horizontal axis, and the height of each bar indicates the frequency of each score. In a histogram, frequency is nearly always plotted on the vertical axis, although in many bar graphs frequency
is often shown on the horizontal axis. The bars of a histogram are drawn immediately adjacent to each other because a histogram represents a frequency distribution associated with an interval with an interval or ratio scale, and there are no gaps between adjacent intervals on these scales. Each bar in this histogram can be considered as stack of squares, where each squares are shown for some of the scores in Figure, although this is not usually done. If each of the squares has a unit area an area equal to 1.00, then the total area of the histogram if equal to \(N\), the total number of scores. The proportion of scores falling above or below some particular score in a distribution is often of great interest, as we will see, and that proportion of scores is exactly equal to the proportion of the area of histogram falling above or below the point of interest. For example, in Figure 4 we can readily see that about half of the scores are higher than 16.

![Histogram](image)

*Fig. 1. Histogram showing the frequency distribution from Table shown on page 89. Each small square associated with a score of 15 has a unit area, and thus the total area of the histogram is equal to 30, the total \(N\) of the distribution.*

In many cases, it will not be possible to represent each individual in a histogram by a square of unit area, since in a large distribution the resulting bars would be far too high to fit on a page. For example, it there were 300 students - rather than 30 - in the frequency distribution in Table shown on page, then in order to show that larger distribution in a histogram, we would need to compress the vertical scale considerably. The unit squares would then be compressed into flattened rectangles, each representing a single person in the distribution. If we consider each of those flattened rectangles, as having a unit area,
then the total area of the histogram is equal to N, no matter how large N may be, and no matter how much we may have compressed the vertical scale.

While the vertical scales of histograms and of other graphs are largely arbitrary, many writers have suggested following the three-quarters rule, a convention holding that the vertical extent of a graph should be about three-fourths as great as the horizontal extent.

This convention represents no law of nature - or even of mathematics - and is often disregarded for one good reason or another, but the rule does provide a useful guide. Frequency distributions prepared in accordance with the three-quarters rule convey the most information with the least distortion, in most situations.

**Frequency Polygons.** The histogram in Figure 4 is reproduced in Figure 5, where we have placed a dot at the midpoint of the top of each bar. We have also placed a dot on the horizontal axis at a score of 1, indicating a frequency of zero for that score. Connecting adjacent dots with a series of straight lines yields a frequency polygon, a many-sided closed figure. The straight lines cut off a number of triangular areas from the tops of the bars, but every such area exactly fits into a vacant area with the frequency polygon is exactly equal to the area of the histogram.

![Diagram](image_url)

*Fig. 2. Same histogram as in Fig. J connecting the dots yields a frequency polygon. Each triangular portion of the histogram lying above and outside the frequency polygon exactly fits into a vacant area lying inside and below. Thus, the area of the frequency polygon is the same as that of the histogram.*
Figure 6 shows, the frequency polygon by itself. Notice that we have placed a dot on this horizontal axis just below the lowest score in the distribution and another just above the highest, thus indicating a frequency of zero for the two scores just outside the distribution. If these two points were not included, the frequency polygon would not be a closed figure having the same area as the histogram. We will very shortly develop a number of numerical methods of dealing with frequency distributions, but you will nevertheless often find it useful to work up a distribution in graphic form. A frequency polygon can be drawn more quickly than a histogram and is therefore a more useful representation for many purposes.

Fig. 3. Frequency polygon in Fig. 2. shown by itself.

Fig. 4. Frequency polygon where the highest possible score, 20, has a non zero frequency. Strictly speaking, frequency polygon is a misnomer here. Since the plot of this distribution does not form a closed figures.
A problem arises when the highest (or lowest) score actually occurring in a distribution is the highest (or lowest) score possible. For example, suppose that several students got perfect examination scores, say 20 out of 20 possible points on a multiple-choice examination. The frequency polygon for such a distribution is shown in Figure 7. It is unrealistic to place a dot on the horizontal axis indicating a zero frequency for a score of 21 points, since this might suggest that a score would be possible. Thus, we are left with a frequency polygon that is not really a polygon at all, since it is not a closed figure, but this is usually preferable to incorporating an impossible score into our distribution.

**Class Intervals.** In the frequency distributions we have considered so far, we have plotted the frequency of each score when constructing a histogram or frequency polygon, sometimes, it is more useful to group the scores into a number of class intervals of equal width, and then plot the frequency of scores falling within each of the class intervals. Figure 8 shows a distribution of scores where the histogram conveys little information about the shape of the distribution. A set of examination scores in a small class will often yield such a histogram.

If the scores in the above distribution are divided into class intervals of 30-39, 40-49, and so on, as in figure 9, then the shape of the distribution becomes much more apparent. Scores near the middle of the distribution are much more frequent than scores near the ends, and this can be seen more readily when the scores are grouped into class intervals. As a rule, if the scores in a frequency distribution cover a range of a great many scale units, and if the frequency of each scores is rather small - as in the present case - then is useful to group the scores into class intervals before plotting the distribution. The scoring should be divided into about 9 to 11 class intervals of equal width, and thus the width of the class intervals will be determined by the number of units on the scoring scale. There is no hard and fast rule about the number of class intervals to use, but it turns out that about 9 to 11 intervals will often yield frequency polygons and histograms that are fairly easy to interpret.
The collected data are classified into classes and sub-classes according to their characteristics. This process is called 'classification'. Then the classified data are presented in precise and systematic tables. This process is called 'tabulation'. By these two processes, the collected data are made simple, easy to understand and systematic.

**Classification**

According to this definition, the chief features of classification are:

1. The basis of classification is unity in diversity.
2. The classification may be either actual or national.
3. The facts are classified into homogenous groups by the process of classification. All the units having similar characteristics are placed in one class or group.
4. The classification may be according to either attributes or characteristics or measurements.

**Objects of Classification**

The chief objects of classification are:

1. *To bring out relationship*. Classification helps in finding out cause effect relationship, if there is any in the data. For example, data of small pox cases occurred more in vaccinated or unvaccinated population.
2. To bring out clearly, points of similarity and dissimilarity Classification brings out clearly the point of similarity and dissimilarity of the data so that they can be easily grasped. Facts having similar characteristics are placed in a class, such as educated, uneducated, employed, unemployed, etc.

3. To present the facts in a simple form. Classification process eliminated unnecessary details and makes the mass of complex data, simple brief, logical and understandable. For example, the data collected in a population census is so huge and fragmented that it is not possible to draw any conclusion from them. When these massive figures are classified according to sex, education, marital status, occupation, etc, then the structure and nature of the population can easily be understood.

4. To facilitate comparison. Classification of data enables one to make comparison, draw inferences and locate facts. This is not possible in an unorganized and unclassified data.

5. To present a mental picture. The process of classification enables one to form a mental picture of objects of perception and conception. Summarised data can easily be understood and remembered.

6. To prepare the basis for tabulation. Classification prepares the basis for tabulation and statistical analysis of the data. Unclassified data cannot be presented in tables.

Though many advantages are derived from classification, some amount of details is lost in the process of summarization. The greater is the extent of summarization the more is the loss of details. The statistician will have to weigh and balance the advantages he would derive from summarization, the loss of details he will have to suffer, and decide on the extent of summarization he will have.

**Characteristics of Classification**

When we make a classification, we break up the subject matter into a number of classes. It is important that the classification should possess following characteristics:

1. **Stability.** Classification must proceed at every stage in accordance with one principle and that principle should be maintained throughout. If a classification is not stable and is changes for every enquiry, then data would not be fit for comparison.

2. **Flexibility.** A good classification should be flexible and should have the capacity of adjustment to new situations and circumstances.

3. **Homogeneity** The items included in one class should be homogeneous.
4. **Mutually Exclusive.** The classes must not overlap. That is, each item of data must find its place in one class and one class only. There must be no item which can find its way into more than one class.

5. **Exhaustive.** The classification system must be exhaustive. There must be no item which cannot find a class. There must be a class for each item of data in one of the classes. If classification is made exhaustive, there will be no place for ambiguity.

6. **Arithmatical Accuracy.** The total of the items included in different classes, should tally with the total of the universe.

7. **Suitability.** The classification should conform to the object of enquiry. If an investigation is carried on to enquire into the economic conditions of labourers, then it will be useless to classify them on the basis of their religion.

**Methods of Classification**

Every item of the collected data has its own characteristics. These characteristics can be of two kinds: measurable characteristics, which are called quantitative variables; and non-measurable characteristics, called qualitative variables or attributes. Measurable characteristics are: height, weight production, etc. Sex, marital status, education, etc., are the characteristics which cannot be measured. Hence, statistical data can have two kinds of classification, (a) classification according to attributes or qualitative classification, and (b) classification according to variables or quantitative classification.

**DEFINITION OF TABLE AND TABULATION**

“A statistical table is a systematic arrangement of data in labeled columns and rows”. According to Prof. Neiswanger, “A statistical table is a systematic organization of data in columns and rows”. Turtle has given a comprehensive definition of statistical table in these words. “A statistical table is the logical listing of related quantitative data in vertical columns and horizontal rows of numbers, with sufficient explanatory and qualifying words, phrases and statements in the form of titles, headings and noted to make clear the full meaning of the data and their origin”. According to these definitions, a statistical table is a arrangement of systematic presentation of data in columns and rows.

Tabulation is the process of tabulating data in tables. Tabulation is a process of outcome of which are statistical tables. Thus, tabulation is defined as a process. In brief, tabulation is a scientific process involving the presentation of classified data in a orderly manner so as to bring out their essential features and chief characteristics.
Objects of Tabulation

Tabulation is a process which helps in understanding complex numerical facts. “The purpose of a table is to summarize a mass of numerical information and to present it in the simplest possible form consistent with the purpose for which it is to be used. In a very real sense, the statistical table serves the statistician in much the same fashion that poetry serves the writer - it is a medium of communication of great economy and effectiveness for which ordinary prose is an adequate.....In addition to its function in simple presentation, the statistical table is also a useful tool of analysis.” Tabulation has following objectives to fulfill;

1. **To clarify the characteristics of data.** A table presents facts clearly and concisely, eliminating the need for wordy explanation. It brings out the chief characteristics of data.

2. **To clarify the object of investigation.** “The function of tabulation in the general scheme of statistical investigation is to arrange in easily accessible form the answer with which the investigation is concerned”. The presentation of data in tables make the problem under study simple and clear and answers many problems that are found there.

3. **To facilitate statistical process.** It simplifies reference to data facilitates comparative analysis and interpretation of the facts.

4. **To present facts in the minimum of space.** A table presents facts in minimum space and communicates information in a far better way than textual material.

Advantages of Tabulation

Tabulation is an important process between collection and classification of data and their interpretation. The tabular presentation of data has several distinct advantages. They are:

1. **Facilitates Computation.** It helps in computation of different statistical measures. For calculating average, dispersion, correlation, etc., data must by presented in tables.

2. **Helps classification.** While classification is a theoretical process of data analysis, tabulation is an applied process. Tabulation is helpful in classification also. After classifying data the characteristics of different classes are not clear till they are placed in a suitable table.

3. **It simplifies facts.** Tabulation is helpful in presenting mass of complex data clearly so that their features can easily be understood. After tabulation, data get a definite
form and structure, and can be studied from up to below and left to right easily. It reveals patterns within the figures which cannot be seen in narrative form.

4. **Economy.** It occupies less space than textual reports hence saving of paper and time. Required figures can be located more quickly.

5. **Helpful in comparison.** Tabulation makes comparison easy. Comparable figures are placed in juxtaposed columns, hence a comparative study can be made.

6. **Helps in reference.** Tabulated data are good for reference purposes.

7. **Helps in interpretation and presentation.** It is convenient to interpret tabulated data. Tabulated data make it easy to present the facts in a graphical and diagrammatic form.

**DIFFERENCE BETWEEN CLASSIFICATION AND TABULATION**

In statistical investigation, classification and tabulation both are important processes, by which collected data are summarized and put in systematic order. Still, there are some differences between these two processes. They are;

1. Both the processes have to be done in a sequence. One is not the substitute for the other. First, data are classified, then they are presented in tables. Hence, classification forms the basis for tabulation.

2. In classification process, data are classified into different classes according to their similarities and dissimilarities. In tabulation the classified data are place in columns and rows. Thus, tabulation is a mechanical function of: classification.

3. Classification is a process of statistical analysis, tabulation is a process of presenting data in suitable structure.

In short, classification process data are classified into classes and subclasses, while tabulation presents those classified data permanently under headings or sub-headings. Tables may also contain derivatives like percentages, coefficients, proportions, etc, to facilitate comparison.

**Limitation of Tabulation**

Tabulation has got certain limitations as well:

1. A table contains only figures and not their description. It is not easy to understand it by persons who are nor adept in assimilating facts from tables.
2. It requires a specialized knowledge to understand a table. A layman cannot derive any conclusion from a table.

3. A table does not lay emphasis on any section of particular importance.

After we have classified the statistics into various groups, we find out Frequency After we have classified the statistics into various groups, we have to see that which figures of our disorganized list, are included in each group and how many of the figures are there. We shall have to see about each figure of the disorganized list and its position in each group. A perpendicular line shall be drawn against the group in which a particular figure of the disorganized group finds a place. This perpendicular line is called Tally. If against one group, we have put 4 Tallies and again we have to put fifth against it, we shall draw it in such a way that it runs across for straight lines.

It may be drawn like this 1111 (4 Tallies) 1111 (5 Tallies). we have to put 8 Tallies against one group, we shall put them like this - 1111 111. Now we shall try to draw Tallies against the groups that we have already drawn. A chart of the same is given below:

<table>
<thead>
<tr>
<th>Class Interval</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>86-88</td>
<td>1111 I</td>
</tr>
<tr>
<td>83-85</td>
<td>II</td>
</tr>
<tr>
<td>80-82</td>
<td>I</td>
</tr>
<tr>
<td>77-79</td>
<td>II</td>
</tr>
<tr>
<td>74-76</td>
<td>II</td>
</tr>
<tr>
<td>71-73</td>
<td>III</td>
</tr>
<tr>
<td>68-70</td>
<td>II</td>
</tr>
<tr>
<td>65-67</td>
<td>II</td>
</tr>
<tr>
<td>62-64</td>
<td>1111 I</td>
</tr>
<tr>
<td>59-61</td>
<td>II</td>
</tr>
<tr>
<td>56-58</td>
<td>1111 I</td>
</tr>
<tr>
<td>53-55</td>
<td>II</td>
</tr>
</tbody>
</table>

| Total | 36 |

After putting Tallies against each group, they are added up and written out. In the end the total of the frequencies is found out. This total is called \( \sigma F(Zf) \).
Frequency Distribution of Test Scores for a class of 30 Students.

<table>
<thead>
<tr>
<th>Score X</th>
<th>Tally</th>
<th>Frequency f</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>21</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>1 1</td>
<td>2</td>
</tr>
<tr>
<td>18</td>
<td>1111</td>
<td>5</td>
</tr>
<tr>
<td>17</td>
<td>1111 1</td>
<td>6</td>
</tr>
<tr>
<td>16</td>
<td>1111 1111</td>
<td>10</td>
</tr>
<tr>
<td>15</td>
<td>1111</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ n = 30 = \sum f \]

FREQUENCY DISTRIBUTION

Frequency distribution is simply a table in which the data are grouped into classes and the number of cases which fall in each class are recorded. In other words, it shows the frequency of occurrence of different values of single phenomenon. A frequency distribution is constructed for three main reasons: (i) to facilitate the analysis of data, (ii) to estimate frequencies of the unknown population distribution from the distribution of sample data and (iii) facilitate the computation of various statistical measures.

Kinds of Frequency Distribution

Basically, frequency distribution can be of two kinds:

1. Univariate Frequency Distribution.
2. Bivariate Frequency Distribution.

Univariate frequency distribution is of three types:

(i) Series of individual observations or simple frequency table:
(ii) Discrete series; and
(iii) Continuous series.
(a) **Series of Individual Observations.** Series of individual observations is a series where items are listed singly after observation, as distinguished from listing them groups. If marks of 50 students in a particular subject are given individually, it will form a series of individual observations.

(b) Discrete Series. In a discrete series the data are presented in a way that exact measurements of units are clearly indicated. There is definite difference between the variables of different groups of items. Each class is distinct and separate from the other classes. Non-continuity from one class to another exists. Data on such facts like, per family children, or per house rooms, etc. are given in discrete series. It is like:

<table>
<thead>
<tr>
<th>Per family</th>
<th>Children (m)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of families (f)</td>
<td></td>
<td>10</td>
<td>20</td>
<td>50</td>
<td>60</td>
<td>40</td>
<td>12</td>
<td>8</td>
<td>200</td>
</tr>
</tbody>
</table>

(c) **Continuous Series.** Continuous series is one where measurements are only approximations and are expressed in class, i.e., within certain limits. In a continuous frequencies distribution the class intervals theoretically continue from the beginning of the frequency distribution to the end without a break. The continuous frequency distribution can always be distinguished from the discrete frequency distribution in that it will contain two ‘limits’ - upper limits and lower limits of each class interval - while the discrete frequency distribution will possess only one ‘list’ of classification of values.

Below is an example of a continuous series:

<table>
<thead>
<tr>
<th>Marks obtained</th>
<th>0-20</th>
<th>20-40</th>
<th>40-60</th>
<th>60-80</th>
<th>80-100</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Students (Frequency)</td>
<td>10</td>
<td>15</td>
<td>30</td>
<td>15</td>
<td>10-80</td>
</tr>
</tbody>
</table>

*Classification by class-intervals or groups.* The classification by groups or class intervals is possible only in those cases where the direct quantitative measurement of data is possible. Data pertaining to height, weight, income, export, production, marks, etc. comes under this category. Suppose, we have to study the expenses of one thousand students of a college, data will be the amount of expenses incurred by every student to the nearest rupee. We will have 1000 figures ranging from, say Rs.50 to 200. These figures will have to be grouped in such a way that the mass of data becomes precise and easy to understand. In this case we can group students according to their expenses within a certain range, say of 25. The series will be formed in this way.
### Definitions in regard to construction of series

(i) **The Range.** The range of a frequency distribution may be defined as the difference between the lower limit of the first class interval and the upper limit of the last class interval.

(ii) **Class Intervals.** The class interval may be defined as the size of each grouping of data.

(iii) **Class Limits.** The class limits of a frequency distribution are defined as the upper and lower limits of each interval.

(iv) **Magnitude of class intervals.** The difference between upper and lower limits of a class is called the magnitude of the class.

(v) **Mid-value or Mid-point.** The central point of a class interval is called its mid-value or mid-point.

(vi) **Frequency.** Number of observations falling within a particular class interval is called frequency of that class.

#### A Few Problems in Classification by Class Intervals.

In preparing a frequency distribution by class intervals, a few problems are discussed below:

1. **The magnitude of class Intervals.** The class intervals themselves should be of equal size. Under most circumstances, it is possible to keep each class interval the same size as every other class interval. However, for some kinds of data it is justifiable to have different sizes of class intervals. The situation in which, all the class intervals were of the same size, the result would be that some class intervals

---

<table>
<thead>
<tr>
<th>Class Intervals Expenses in Rupees</th>
<th>Frequencies No. of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowest value</td>
<td></td>
</tr>
<tr>
<td>50-57</td>
<td>200</td>
</tr>
<tr>
<td>75-100</td>
<td>150</td>
</tr>
<tr>
<td>100-125</td>
<td>300</td>
</tr>
<tr>
<td>125-150</td>
<td>150</td>
</tr>
<tr>
<td>150-175</td>
<td>150</td>
</tr>
<tr>
<td>175-200 Largest value</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>1000</td>
</tr>
</tbody>
</table>

---
would have no data on them or very few data, whereas other class intervals would have very sizeable numbers of data in them the use of different sizes of class intervals in necessary.

2. **Number of class intervals.** The number of class intervals in a frequency distribution should be such as to allow for advantageous summarization and to make the characteristics of the data emerge. It is necessary to decide as to want should be the number of class intervals. Though there us no hard and fast rule regarding the number of class intervals, yet their number should be neither very large nor very small. It should preferably lie between 5 and 15. If there are too many class intervals, the data become two fragmented to give a picture of the distribution as a whole. Fewer class intervals will make the data too concentrated, so as not to throw light on their characteristics. In both the conditions there will be difficulty.

### METHODS OF FORMING CLASS INTERVALS

There are two ways of forming class intervals;

1. **Exclusive Method**
2. **Inclusive Method**

**Exclusive Method**

Under the exclusive method the upper limit of one class intervals is the lower limit of the next class. In the above example the upper limit of the first class interval is 75, which is the lower limit of the next class. Similarly, the upper limit of the second class interval is 100 which is the lower limit of the third class interval. All variables having the value of 50 and more but lee than 75 will be grouped in 50-75 class interval. The item having the value of 75 will be put in 75-100 class. In other words, the items valuing the upper limit of a class are put in the next class. **Inclusive Method**

There is another method of framing the class intervals. In this method, known as inclusive method, ambiguity about items identical to a limit of the class interval is sought to be removed. Under this method the classes in the above example will be : 50-74, 75-99, 100-124, 125-149, 150-174 and 175-199. If there are no whole numbers then the classes can be made like this: 50-74-9, 75-99-9. 100-124-9, 125-149-9, 150-174-9 and 175-199-9.
These Methods may be illustrated as follows:

<table>
<thead>
<tr>
<th></th>
<th>A (Exclusive Method)</th>
<th>B (Inclusive Method)</th>
<th>C (Inclusive Method)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>Frequency</td>
<td>Class</td>
<td>Frequency</td>
</tr>
<tr>
<td>5-10</td>
<td>7</td>
<td>5-9</td>
<td>7</td>
</tr>
<tr>
<td>10-15</td>
<td>10</td>
<td>10-14</td>
<td>10</td>
</tr>
<tr>
<td>15-20</td>
<td>13</td>
<td>15-19</td>
<td>13</td>
</tr>
<tr>
<td>20-25</td>
<td>18</td>
<td>20-24</td>
<td>18</td>
</tr>
<tr>
<td>25-30</td>
<td>8</td>
<td>25-29</td>
<td>8</td>
</tr>
<tr>
<td>30-35</td>
<td>5</td>
<td>30-34</td>
<td>5</td>
</tr>
<tr>
<td>35-40</td>
<td>3</td>
<td>35-39</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
<td>64</td>
<td>64</td>
</tr>
</tbody>
</table>

In inclusive method the problems arises in identifying the real class limits and mid points. The mid-points found by adding either the stated or the real limits and dividing by 2.

There is another way of giving a series. Sometimes full class intervals are not given, only mid-points are given. For example, series may be written like:

<table>
<thead>
<tr>
<th>Mid-value</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-5</td>
<td>7</td>
</tr>
<tr>
<td>12-5</td>
<td>10</td>
</tr>
<tr>
<td>17-5</td>
<td>13</td>
</tr>
<tr>
<td>22-5</td>
<td>18</td>
</tr>
<tr>
<td>27-5</td>
<td>8</td>
</tr>
<tr>
<td>32-5</td>
<td>5</td>
</tr>
<tr>
<td>37-5</td>
<td>3</td>
</tr>
</tbody>
</table>

To convert such a series into that of class intervals, following steps should be taken:

1. Find out the difference between mid-values.
2. Difference should be halved and by deducting half the difference from the mid-value, lower limit of the class will be found out and by adding half the difference to the mid-value upper limit of the class will be found out.

In the above example, difference between two mid-values is of 5, half of this mid-values is of 5, half of this 5/2-2-5, when deducted from mid-value, 7-5-2-5 = 5 is the lower limit and when added to mid-value, 7-5 + 2-5 = 10 is the upper limit of the class. Hence, the classes will be, 5 - 10, 10- 15, 15 -20, 25 -30, 30-35 and 35 -40.
In certain frequency distributions, ‘open end’ class intervals are given as we find in the example given below:

<table>
<thead>
<tr>
<th>Class</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below</td>
<td>7</td>
</tr>
<tr>
<td>10-15</td>
<td>10</td>
</tr>
<tr>
<td>15-20</td>
<td>13</td>
</tr>
<tr>
<td>20-25</td>
<td>18</td>
</tr>
<tr>
<td>25-30</td>
<td>8</td>
</tr>
<tr>
<td>30-35</td>
<td>5</td>
</tr>
<tr>
<td>Above</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>64</strong></td>
</tr>
</tbody>
</table>

In such cases, values are put on the basis of construction of the series. In the above series ‘5’ in place of ‘below’ and ‘40’ in place of ‘above’ may be put.

**Cumulative Series.** Cumulative frequency distribution has a running total of the values. It is constructed by adding frequencies of the first class interval to the frequencies in the second class interval, that total is added to the frequencies in the third class interval continuing until the final appearing opposite the last class interval will be the total of all frequencies. The cumulation may be downward or upward. A downward cumulation results in a list presenting the number of frequencies “less than” any given amount as revealed by the lower limit of succeeding class interval; and an upward cumulation results in a list presenting the number of frequencies “more than” given amount as revealed by the upper limit of a preceding class interval. Cumulatives series take the following shapes.

<table>
<thead>
<tr>
<th>Downward cumulation</th>
<th>Upward cumulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Below or less than</td>
<td>Above or more than</td>
</tr>
<tr>
<td>Frequency</td>
<td>Frequency</td>
</tr>
<tr>
<td>&quot; &quot;</td>
<td>10 7</td>
</tr>
<tr>
<td>&quot; &quot;</td>
<td>15 17</td>
</tr>
<tr>
<td>&quot; &quot;</td>
<td>20 30</td>
</tr>
<tr>
<td>&quot; &quot;</td>
<td>25 48</td>
</tr>
<tr>
<td>&quot; &quot;</td>
<td>30 56</td>
</tr>
<tr>
<td>&quot; &quot;</td>
<td>35 61</td>
</tr>
<tr>
<td>&quot; &quot;</td>
<td>40 64</td>
</tr>
<tr>
<td>&quot; &quot;</td>
<td>35 3</td>
</tr>
<tr>
<td>&quot; &quot;</td>
<td>30 8</td>
</tr>
<tr>
<td>&quot; &quot;</td>
<td>25 16</td>
</tr>
<tr>
<td>&quot; &quot;</td>
<td>20 34</td>
</tr>
<tr>
<td>&quot; &quot;</td>
<td>15 47</td>
</tr>
<tr>
<td>&quot; &quot;</td>
<td>10 57</td>
</tr>
<tr>
<td>&quot; &quot;</td>
<td>5 64</td>
</tr>
</tbody>
</table>

The below series are cumulative frequency series. In the table ‘A’, class frequencies will be found out by deducting the cumulative frequency of the class from the cumulative of the next class. For example;
### INTRODUCING EDUCATION

#### Class Frequency

<table>
<thead>
<tr>
<th>Class</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-10</td>
<td>7</td>
</tr>
<tr>
<td>10-15</td>
<td>17-7</td>
</tr>
<tr>
<td>15-20</td>
<td>30-17</td>
</tr>
<tr>
<td>20-25</td>
<td>48-30</td>
</tr>
<tr>
<td>25-30</td>
<td>56-48</td>
</tr>
<tr>
<td>30-35</td>
<td>61-56</td>
</tr>
<tr>
<td>35-40</td>
<td>64-61</td>
</tr>
</tbody>
</table>

#### In the table ‘B’ class frequency will be found out by deducting the cumulative frequency of the next class from the cumulative frequency of the class. For example;

<table>
<thead>
<tr>
<th>Class</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-10</td>
<td>64-57</td>
</tr>
<tr>
<td>10-15</td>
<td>57-47</td>
</tr>
<tr>
<td>15-20</td>
<td>47-34</td>
</tr>
<tr>
<td>20-25</td>
<td>34-16</td>
</tr>
<tr>
<td>25-30</td>
<td>16-8</td>
</tr>
<tr>
<td>30-35</td>
<td>8-3</td>
</tr>
<tr>
<td>35-40</td>
<td>3-0</td>
</tr>
</tbody>
</table>

#### Relative frequency distribution.

It is sometimes required to show the relative frequency of occurrences rather than actual number of occurrences in each segment of the scale. If the actual frequencies are expressed as a percent of the total number of observations, relative frequencies are detained. An example is given on next page to illustrate frequency distribution.

<table>
<thead>
<tr>
<th>Class</th>
<th>Frequency</th>
<th>Relative Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>52</td>
<td>23.6</td>
</tr>
<tr>
<td>10-20</td>
<td>34</td>
<td>15.5</td>
</tr>
<tr>
<td>20-30</td>
<td>70</td>
<td>31.8</td>
</tr>
<tr>
<td>30-40</td>
<td>26</td>
<td>11.8</td>
</tr>
<tr>
<td>40-50</td>
<td>16</td>
<td>7.3</td>
</tr>
<tr>
<td>50-60</td>
<td>12</td>
<td>5.5</td>
</tr>
<tr>
<td>60-70</td>
<td>8</td>
<td>3.5</td>
</tr>
<tr>
<td>70-80</td>
<td>2</td>
<td>0.9</td>
</tr>
<tr>
<td>Total</td>
<td>220</td>
<td>100.0</td>
</tr>
</tbody>
</table>
MEASURES OF CENTRAL TENDENCY

Sometimes we find that in statistical data, there is some number near-about which other numbers exist. In other words, it means that the remaining numbers are near-about the central digit. It means that other numbers are either lower than that particular number or slightly over or more than that. Then this tendency of statistical data is called Central Tendency. For example, imagine that there are five students who have secured 8, 9, 10, 11 and 12 marks respectively. On scrutiny, we find, almost all the figures are near-about the figure of 10. The remaining figures are either less than 10 or slightly more than that figure. This tendency of the figures shall be called Central Tendency.

Educational Value of Central Tendency

This tendency has its use in education as well. Sometimes a student of a class wants to find out his position in the class. In other words, he wants to known his position in reference to ordinary and normal students. In such a situation he shall try to know the central figure. He tries to do it by any of the three methods given below:

1. Finds out the Mean and carries out the comparison with other students.
2. He finds out the Medium of the marks secured by various students of his class.
3. Thirdly, he tries to find out the average marks that the students have secured. In other words, he finds out the Mode and compares his position.

Let us now try to find out what this Mean, Medium and Mode are:

Method to Find out Mean

The method to find out the Mean of Ungrouped figures or statistics. The first thing that has to be seen is to find out whether the marks of the student have secured are Grouped or Ungrouped.

If the marks secured by the students are not given in groups, then the method, to find out their Mean, is to add those figures. Then divide that total by the number of the students. Suppose, five students have secured 40, 45, 60, 75 and 80 marks respectively and their average has to be found out. Then these figures should be added up and divided by the figure of 5 like this:

\[
\frac{40 + 45 + 60 + 75 + 80}{5} = \frac{300}{5} = 6
\]

The average shall now be 60. In other words, it means that the marks of the five students are near-about 60.

The method of finding out the mean is the same by which we find out the Arithmetic Mean.
**Method of finding out the Mean of Grouped Statistics.** When the number of statistical data is in huge quantity, such as thousands, then it is difficult to find out the Mean by the method given above. In such cases statistical figures are not kept separately, but their Frequency Distribution is made.

**Example.** Find out the mean of the following;

<table>
<thead>
<tr>
<th>Marks</th>
<th>Frequency</th>
<th>Mid-point</th>
<th>Frequency distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>28-32</td>
<td>4</td>
<td>30</td>
<td>120</td>
</tr>
<tr>
<td>23-27</td>
<td>5</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>18-22</td>
<td>8</td>
<td>20</td>
<td>160</td>
</tr>
<tr>
<td>13-17</td>
<td>7</td>
<td>15</td>
<td>105</td>
</tr>
<tr>
<td>8-12</td>
<td>6</td>
<td>10</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td><strong>30 = f</strong></td>
<td></td>
<td><strong>Σfx = 570</strong></td>
</tr>
</tbody>
</table>

∑ (Sigma) = Grand Total  

f = Frequency  
x = Central point  
fx = Multiplication of the frequency by the Central point of the groups.  
N = Total number of Cases

In the list given above, the first group is 8-12 and its frequency is 6. It means that 6 students have secured marks between 8 and 12. Now the question is, how many marks, has each student, out of the 6, secured? According to statistics, the Central point or Median states how many marks each student has secured. The Central point (Mean) of the first Group 8-12 is 10. Thus we can say that out of the 6 students, each has secured 10 marks. In other words, all the students have secured 10x6=60 marks in total. Thus it means that we can find out the total number of the marks secured by the students of each group by multiplying the Central Point or Median by frequency. In the end, by adding up or totaling the frequencies, we can find out how many students are there. Then, by adding the multiples of the Central point (or Median) and the frequencies, we can know how many students have secured how many (or total) marks. Thus we can know how many marks, the total number of students have secured. Now by dividing the total number of marks (∑fx) by the total number of students, we can find the Mean or Average.

**Procedure to find out Mean or Average.** In order to find out the Mean, the following steps should be taken:

(a) The Median or the Central point and its frequent should be multiplied.

(b) Then the multiples and the frequencies should be added up separately.
(c) The total of the multiples should be divided by the total number of the frequencies. According to the steps give above, the Mean may be found out with the help of the following formula:

\[
\text{Mean} = \frac{\text{Total of the multiples of the Central point and frequencies (f)}}{\text{Total of frequencies}}
\]

According to this formula the average of the figures or statistics given above, shall be: \(\frac{570}{30} = 19\)

In other words, the Mean shall be 19

\[\therefore \text{Mean} = \frac{\sum fx}{N}\text{ or } \frac{\text{Total of (Median or Central point) x (Frequency) number or (Total of frequencies)}}{\text{Total of frequencies}}\]

Now we shall try to solve another example and find out the Mean, this shall clarify the whole procedure more.

**Example:** Students of a class have secured the following marks in Mathematics. Find out the Mean of their marks by the Long Method:

97, 94, 92, 33, 47, 19, 28, 87, 9, 37, 54, 77, 5,
1, 69, 41, 70, 35, 59, 84, 30, 16, 85, 33, 34, 49,
72, 91, 2, 48, 79, 21, 7, 26, 51, 14, 81, 45, 75,
47, 83, 69, 12, 66, 36, 64, 25, 43, 68, 32, 67, 24,
15, 62, 11,

<table>
<thead>
<tr>
<th>Difference between Group or span of Groups</th>
<th>Median of Central Point of Groups</th>
<th>Frequency (f)</th>
<th>Median of Group (x) Frequency Fx</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-99</td>
<td>94-5</td>
<td>4</td>
<td>378-0</td>
</tr>
<tr>
<td>80-89</td>
<td>84-5</td>
<td>5</td>
<td>422-5</td>
</tr>
<tr>
<td>70-79</td>
<td>74-5</td>
<td>5</td>
<td>372-5</td>
</tr>
<tr>
<td>60-69</td>
<td>64-5</td>
<td>7</td>
<td>451-5</td>
</tr>
<tr>
<td>50-59</td>
<td>54-5</td>
<td>3</td>
<td>163-5.</td>
</tr>
<tr>
<td>40-49</td>
<td>44-5</td>
<td>7</td>
<td>311-5</td>
</tr>
<tr>
<td>30-39</td>
<td>34-5</td>
<td>8</td>
<td>276-0</td>
</tr>
<tr>
<td>20-29</td>
<td>24-5</td>
<td>5</td>
<td>122-5</td>
</tr>
<tr>
<td>10-r9</td>
<td>14-5</td>
<td>6</td>
<td>87-0</td>
</tr>
<tr>
<td>0-19</td>
<td>4-5</td>
<td>5</td>
<td>22-5</td>
</tr>
</tbody>
</table>

\[N = 55 \quad \sum fx = 2607.5\]
\[ \text{Mean} = \sum \frac{fx}{N} = \frac{2607.5}{55} = 47.5 \]

Hence, \( M = 47.4 \).

In the method of finding out the Mean given above, there is a good deal of calculation. In the column \( fx \), there are huge figures that run into more digits. This makes the work difficult. Then there is a Short Method, which is more in use. In this method the Mean is assumed. This is called Assumed Mean. With the help of this Assumed mean the real Mean is found out. The procedure of this method is like this:

The Central point or Median of some group which is in the middle of the deviation or which has the highest frequency is taken as Assumed Mean. The Deviation of the other groups from that particular group is put down in the units of the groups. It means that the groups which are above the group in which the Assumed Mean exists, their Deviation is put down with plus sign and the groups that are below that group, their Deviation is put down with minus sign. The numbers this acquired are multiplied by the frequency of the group which contains Assumed Mean. All these products are added up according to the rules of Algebra. This total is divided by \( N \) or total number of the multiplicants, the result of this is known as Corrected Value or \( C \). Now this is multiplied by the multiplicant figure which is indicated by \( T \). When this is added to the Assumed Mean, then actual mean is found out. If Deviation figure is indicated by \( 'x' \), then the formula for finding out the mean shall be like this:

\[
\text{Mean} = \text{Assumed Mean (or A.M.)} + \frac{\sum fx}{N}; \text{ or } M = \text{A.M.} + Ci
\]

(Where \( M \) is Mean. \( C = \frac{\sum fx}{N} \) and A.M. is Assumed Mean).

Now we shall find out the mean of the figures given above through the short Method.

<table>
<thead>
<tr>
<th>Difference between Group or span of Groups</th>
<th>Median of Central Point of Groups</th>
<th>Frequency (f)</th>
<th>Deviation (x’)</th>
<th>Frequency Deviation (fx’)</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-99</td>
<td>94-5</td>
<td>4</td>
<td>+5</td>
<td>+20</td>
</tr>
<tr>
<td>80-89</td>
<td>84-5</td>
<td>5</td>
<td>+4</td>
<td>+20</td>
</tr>
<tr>
<td>70-79</td>
<td>74-5</td>
<td>5</td>
<td>+3</td>
<td>+15</td>
</tr>
<tr>
<td>60-69</td>
<td>64-5</td>
<td>7</td>
<td>+2</td>
<td>+14</td>
</tr>
<tr>
<td>50-59</td>
<td>54-5</td>
<td>3</td>
<td>+1</td>
<td>+3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+72</td>
</tr>
<tr>
<td>40-49</td>
<td>44-5</td>
<td>7</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>30-39</td>
<td>34-5</td>
<td>8</td>
<td>-1</td>
<td>-8</td>
</tr>
<tr>
<td>20-29</td>
<td>24-5</td>
<td>5</td>
<td>-2</td>
<td>-10</td>
</tr>
<tr>
<td>10-19</td>
<td>14-5</td>
<td>6</td>
<td>-3</td>
<td>-18</td>
</tr>
<tr>
<td>0-19</td>
<td>4-5</td>
<td>5</td>
<td>-4</td>
<td>-20</td>
</tr>
</tbody>
</table>

Span of Groups (x) | (f) | (x’) | (fx’)
---|-----|------|------
N = 55 | | | \( \sum fx' = 16 \)
\[ \text{Mean} = \text{A.M.} + \frac{\sum fx}{N} \times i \]

\[ = \text{Assumed Mean} + \frac{\sum fx}{N} \times 1 \]

\[ = 44.5 + \frac{16}{55} \times 10 \]

\[ = 44.5 + 2.9 = 47.4 \]

Hence, Mean = 47.4

**Example.**

<table>
<thead>
<tr>
<th>Number</th>
<th>Mid Point (x)</th>
<th>f</th>
<th>fx</th>
</tr>
</thead>
<tbody>
<tr>
<td>120-122</td>
<td>12</td>
<td>1</td>
<td>121</td>
</tr>
<tr>
<td>117-119</td>
<td>118</td>
<td>3</td>
<td>354</td>
</tr>
<tr>
<td>114-116</td>
<td>115</td>
<td>4</td>
<td>460</td>
</tr>
<tr>
<td>111-113</td>
<td>112</td>
<td>7</td>
<td>784</td>
</tr>
<tr>
<td>108-110</td>
<td>109</td>
<td>9</td>
<td>981</td>
</tr>
<tr>
<td>105-107</td>
<td>106</td>
<td>4</td>
<td>424</td>
</tr>
<tr>
<td>102-104</td>
<td>103</td>
<td>5</td>
<td>515</td>
</tr>
<tr>
<td>99-101</td>
<td>100</td>
<td>4</td>
<td>400</td>
</tr>
<tr>
<td>96-98</td>
<td>97</td>
<td>2</td>
<td>194</td>
</tr>
<tr>
<td>93-95</td>
<td>94</td>
<td>2</td>
<td>188</td>
</tr>
<tr>
<td>90-92</td>
<td>91</td>
<td>1</td>
<td>91</td>
</tr>
</tbody>
</table>

\[ N = 42 \]

\[ \sum fx = 4512 \]

\[ \text{Mean} = \frac{\sum fx}{N} = \frac{4512}{42} = 107.43 \]

**Example.**

<table>
<thead>
<tr>
<th>Number</th>
<th>Mid Point (x)</th>
<th>f</th>
<th>X</th>
<th>fx</th>
</tr>
</thead>
<tbody>
<tr>
<td>55-59</td>
<td>57</td>
<td>1</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>55-54</td>
<td>52</td>
<td>2</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>45-49</td>
<td>47</td>
<td>4</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>40-4</td>
<td>4</td>
<td>42</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>35-39</td>
<td>37</td>
<td>8</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>30-34</td>
<td>32</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>25-29</td>
<td>27</td>
<td>6</td>
<td>-1</td>
<td>-6</td>
</tr>
<tr>
<td>20-24</td>
<td>22</td>
<td>4</td>
<td>-2</td>
<td>-8</td>
</tr>
<tr>
<td>15-19</td>
<td>17</td>
<td>4</td>
<td>-3</td>
<td>-12</td>
</tr>
<tr>
<td>10-14</td>
<td>12</td>
<td>2</td>
<td>-4</td>
<td>-8</td>
</tr>
<tr>
<td>5-9</td>
<td>7</td>
<td>3</td>
<td>-5</td>
<td>-15</td>
</tr>
<tr>
<td>0-4</td>
<td>2</td>
<td>1</td>
<td>-6</td>
<td>-6</td>
</tr>
</tbody>
</table>

\[ N = 50 \]

\[ \sum fx = -12 \]
\[ AM = 32-00 \quad C = -12/50 = -240 \]
\[ Ci = 1-2 \quad i = 5 \]
\[ M = 30-80 \quad Ci = -1-20 \]
\[ \therefore \text{Mean} = AM + ci = 32 + (-1-20) = 30-80. \]

**Method to Find out the Median**

Median is that figure, above and below which there are equal number of figures. Suppose 5 students have secured 8, 9, 10, 11 and 12 marks respectively, then their Median shall be 10, because on both sides of the 10, there are 2 marks or 2 figure each. If in a list there are 51 figures, then the 26\(^{th}\) shall be the median as 25 figures each on both side. The median is thus a positional average.

In case of ungrouped data, if the number of figures is odd then the median is the middle figure after the figures have been arranged in ascending or descending order of magnitude. In case of even number of figures, there are two middle figures and the median is obtained by taking the arithmetic mean of the middle figures.

For example, the median of the figures 7, 9, 8, 6, 4, 5, 3 i.e., of 3, 4, 5, 6, 7, 8, 9 is 6 and the median of 4, 5, 3, 6, 7, 8, i.e., of 3, 4, 5, 6, 7, 8 is \( [5 + 6] = 5-5 \).

The Method to find out the Median of the grouped figures: Suppose we have to find out the Median of the figures given in the following groups:

<table>
<thead>
<tr>
<th>Groups</th>
<th>Frequencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>38-42</td>
<td>6</td>
</tr>
<tr>
<td>33-37</td>
<td>4</td>
</tr>
<tr>
<td>28-32</td>
<td>3</td>
</tr>
<tr>
<td>23-27</td>
<td>6</td>
</tr>
<tr>
<td>18-22</td>
<td>4</td>
</tr>
<tr>
<td>13-17</td>
<td>5</td>
</tr>
<tr>
<td>8-12</td>
<td>3</td>
</tr>
</tbody>
</table>

The total of the frequencies in the list given above is 31. In other words, it means that there are 31 figures of digits whose Median is to be found out. We have to find out that figure on each side of which there are equal number of digits or figures. Therefore, first of all we have to find out the figure that exists in the centre. The formula in this regard is like this:

\[ \frac{N + 1}{2} \quad \text{or} \quad \frac{\text{Total} + 1}{2} \]
In this way we have to find out the Median of the figure that exists in the centre of the list given above, i.e., \( \frac{31 + 1}{2} = 16 \).

This means that we have to find out the figure which exists at 16th place.

The total of the frequencies of the first three groups from below shall be 3 + 5 + 4 = 12. The total of the frequencies of the first four groups from below shall be 18. Therefore, if we case an attentive eye on the list given above, we shall come to the conclusion that the figure of 16 lies in the fourth group (23-27). Now the Mean of the 12th figure in the list is 22, which is the highest figure of the group 18-22. But we have to find out the figure at 16th place. Therefore, if we add the Mean of the 4 figures more in the Mean of the 12th figure then we shall know the figure at the 16th place. In the 4th group 23-27, there is the span 5 and its frequencies are 6, In this manner the 6 figures divide 5 into equal numbers, but we have to find out the Mean of 4 figures only and thus:

The Mean of 6 is 5. Therefore, Mean of 4 shall be \( \frac{5 \times 4}{6} = \frac{10}{3} \) or 3.3

Now if we add the Mean of 4 figures, i.e., 3.33 to the Mean of the 12th figure or digits, which is 22 and according to the rule of statistics, 22-5, then the Mean of the 16th figure shall be found out:

\[ 22.50 + 3.33 = 25.83 \]

This shall be the Median of the list of groups given above. Formula for finding out the Median

\[
\text{Median} = L + \left( \frac{n - f}{2fm} \times i \right) \]

It can be clarified like this:

L = Lower limit. This is nothing, but the lowest figure of the group in which the Median falls.

\[ \frac{N}{2} = \text{Half of the total frequencies of Total of frequencies} + a \]

F = The total of the frequencies of the groups that are below the group in which the Median exist.

fm = The figure of the span or range of the group in which Median exist.

i = The figure of the span or range of the group in which Median is there.

Now if the Median of the list of the figures given above is to be found out by the formula given both then it should be obtained on the basis of the clarification of the formula.
Let us consider an example where

\[
L = 22.5 \\
\frac{N}{2} = \frac{31 - 1}{2} \\
F = 12, \\
f_m = 6 \\
I = 5.
\]

Hence, according to formula:

\[
\text{Median} = L + \left( \frac{\frac{N}{2} - F}{f_m} \right) \times i
\]

\[
= 22.5 + \frac{16 - 12}{6} \times 5
\]

\[
= 22.5 + \frac{2 - 5}{3}
\]

\[
= 22.5 + \frac{10}{3}
\]

\[
= 22.5 + 3.33
\]

\[
\therefore \text{Mdn} = 25.83
\]

Now we shall solve another example and clarify the procedure of finding out the Median. Here again we shall take the arithmetical multiplicants or Arithmetical Mean.

<table>
<thead>
<tr>
<th>Difference between groups</th>
<th>Frequency</th>
<th>Cumulative Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-99</td>
<td>4</td>
<td>55</td>
</tr>
<tr>
<td>80-89</td>
<td>5</td>
<td>51</td>
</tr>
<tr>
<td>70-79</td>
<td>5</td>
<td>46</td>
</tr>
<tr>
<td>60-69</td>
<td>7</td>
<td>41</td>
</tr>
<tr>
<td>50-59</td>
<td>3</td>
<td>34</td>
</tr>
<tr>
<td>40-49</td>
<td>7</td>
<td>31</td>
</tr>
<tr>
<td>30-39</td>
<td>8</td>
<td>24</td>
</tr>
<tr>
<td>20-29</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>10-19</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>0-9</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

\[
N = 55
\]
Median = \( L + \left( \frac{\frac{N}{2} - F}{fm} \right) \times 1 \)

\[
= 39.5 + \frac{\frac{55}{2} - 24}{7} \times 10
\]

\[
= 39.5 + \frac{27.5 - 24}{7} \times 10
\]

\[
= 39.5 + \frac{3.5}{7} \times 10
\]

\[
= 39.5 + 5 \times 10
\]

\[
= 39.5 + 5
\]

\[
= 44.5
\]

\[\therefore \text{Median} = 44.5\]

**Example**

<table>
<thead>
<tr>
<th>Number</th>
<th>Frequencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>55-59</td>
<td>1</td>
</tr>
<tr>
<td>50-54</td>
<td>2</td>
</tr>
<tr>
<td>45-49</td>
<td>4</td>
</tr>
<tr>
<td>40-44</td>
<td>5</td>
</tr>
<tr>
<td>35-39</td>
<td>8(\underline{20})</td>
</tr>
<tr>
<td>30-34</td>
<td>10</td>
</tr>
<tr>
<td>25-29</td>
<td>6(\underline{20})</td>
</tr>
<tr>
<td>20-24</td>
<td>4</td>
</tr>
<tr>
<td>15-19</td>
<td>4</td>
</tr>
<tr>
<td>10-14</td>
<td>2</td>
</tr>
<tr>
<td>5-9</td>
<td>3</td>
</tr>
<tr>
<td>0-4</td>
<td>1(\underline{N = 50})</td>
</tr>
</tbody>
</table>

\[\text{Mdn} = L + \left( \frac{\frac{N}{2} - F}{fm} \right) \]

Here, \(L = 29.5\), \(\frac{N}{2} = 25\), \(F = 20\), \(fm = 10\), \(I = 5\).

\[\text{Mdn} = 29.5 + \left( \frac{25 - 20}{10} \right) \times 5 = 29.5 + 2.5 = 32\]
**INTRODUCING EDUCATION**

<table>
<thead>
<tr>
<th>Number</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>80-84</td>
<td>4</td>
</tr>
<tr>
<td>75-79</td>
<td>2</td>
</tr>
<tr>
<td>70-74</td>
<td>0</td>
</tr>
<tr>
<td>65-69</td>
<td>0</td>
</tr>
<tr>
<td>{ 60-64</td>
<td>4</td>
</tr>
<tr>
<td>{ 55-59</td>
<td>0</td>
</tr>
<tr>
<td>{ 50-54</td>
<td>0</td>
</tr>
<tr>
<td>{ 45-49</td>
<td>4</td>
</tr>
<tr>
<td>40-44</td>
<td>2</td>
</tr>
<tr>
<td>35-39</td>
<td>2</td>
</tr>
<tr>
<td>30-34</td>
<td>2</td>
</tr>
</tbody>
</table>

\[ N = 20 \]

\[ \frac{N}{2} = 10 \]

Median = \( 54.5 + \frac{0}{4} \times 5 = 54.5 \)

**Method to Find out the Mode**

The number that occurs in the list several times is called Mode. Suppose we have to find mode of the figures.

\[ 2,2,3,3,4,4.5,5,5,5,5,6,6. \]

In this list the number 5 has occurred five times and so it shall be called Mode.

Method to find out the Mode of the ungrouped list of figures can be found out only by observing it as it has been done in the list given above. In that list it was seen that the number 5 occurred maximum number of times and so it was the Mode.

The Method to find out the Mode of the grouped statistical data: In a list of the figures or statistical data that is grouped we take up the central figure or the Mean of that group which contains highest frequencies. We clarify our statement with the help of the two examples given below:

Suppose we have to find out the Mode of the two lists of the statistical data.

**Example:**

<table>
<thead>
<tr>
<th>Group and Mean or central figure</th>
<th>Frequencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>38-40-42</td>
<td>6</td>
</tr>
<tr>
<td>33-35-37</td>
<td>3</td>
</tr>
<tr>
<td>28-30-32</td>
<td>4</td>
</tr>
<tr>
<td>23-25-27</td>
<td>9</td>
</tr>
<tr>
<td>18-20-22</td>
<td>7</td>
</tr>
<tr>
<td>13-15-17</td>
<td>6</td>
</tr>
<tr>
<td>8-10-12</td>
<td>5</td>
</tr>
</tbody>
</table>
In the list given above, we have the highest number of frequencies (9) in the group 23-27. Therefore the mean or the central figure of this group, i.e., shall be the Mode.

Suppose in a list there are 2 adjacent or neighbouring groups whose frequencies are equal. Then in such a condition, we will have to take the Mode of the highest group below there neighbouring groups and that of the lowest of the groups above these neighbouring groups. For example, suppose we have to find out the Mode of the list given below:

**Example:**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Frequencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>33-37</td>
<td>6</td>
</tr>
<tr>
<td>28-32</td>
<td>7</td>
</tr>
<tr>
<td>23-27</td>
<td>9</td>
</tr>
<tr>
<td>18-22</td>
<td>9</td>
</tr>
<tr>
<td>13-17</td>
<td>5</td>
</tr>
<tr>
<td>8-12</td>
<td>5</td>
</tr>
</tbody>
</table>

In the list given above 18-22 and 23-27 are two neighbouring groups. Their frequencies are equal. In other words, their frequencies are 9.9. Therefore, the Mean of the highest figure if the groups below these two neighbouring groups i.e., 22 and lowest figure of the groups above these 2 neighbouring groups, i.e., 23 shall be the Mode. In other words, it shall be 22.5.

**Example:** It is also possible to find out the Mode through the Mean and the Median. It can be done in the following manner:

Suppose the median of some figures is 16 and their mean is 18.

Then since \( \text{Mode} = \text{Mean} - 3 \times (\text{Mean} - \text{median}) \)

\[ \text{Mode} = M - 3M + 3 \text{mdn} \]

\[ \text{Mode} = 3 \text{Md}n - 2 \text{Mean} \]

\[ = 3 \times 16 - 2 \times 18 \]

\[ = 48 - 36 = 12 \]

We shall again apply the Arithmetic Mean Method here and shall clarify the point.

Let the median of some figures be 44-5 and their mean be 47-4.

Then \( \text{Mode} = 3 \text{ mdn} - 2M \)

\[ = 3 \times 44.5 - 2 \times 47.4 \]

\[ = 133.5 - 94.8 = 38.7 \]

**Answer:** Mode = 38-7
The formula to find out the **Mode**. There is a formula as well to find out the Mode. It is being given below:

\[
\text{Mode} = L + \left( \frac{A_1}{A_1 + A_2} \right)
\]

Here, \(L\) = The lowest figure of the group contains highest frequencies.

\(A_1\) = The total number of frequencies of the group above that group.

\(A_2\) = This is the total of the frequencies of the group below that group.

\(f_h\) = The total of the figures of the group that contains highest frequencies.

Let us consider an Example where,

\(L = 22.5\)

\(A_1 = 4\)

\(A_2 = 7\)

Groups Span = 5, because in every group we have the figure of 5.

Therefore, the Mode = \(L + \left( \frac{A_1}{A_1 + A_2} \right)\)

\[= 22.5 + \left( \frac{4}{4 + 7} \right) \times 5\]

\[= 22.5 + \frac{22}{11}\]

\[= 22.5 + 1.8\]

\[= 24.3\] (which is equal to 25)

Calculate the mean, median, and mode for the following frequency distributions. Use the short method in computing the mean.

<table>
<thead>
<tr>
<th>(a) Scores</th>
<th>f</th>
<th>(b) Scores</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>52-53</td>
<td>1</td>
<td>95-99</td>
<td>6</td>
</tr>
<tr>
<td>50-51</td>
<td>0</td>
<td>90-94</td>
<td>11</td>
</tr>
<tr>
<td>48-49</td>
<td>5</td>
<td>85-89</td>
<td>16</td>
</tr>
<tr>
<td>46-47</td>
<td>10</td>
<td>80-84</td>
<td>7</td>
</tr>
<tr>
<td>44-45</td>
<td>9</td>
<td>75-79</td>
<td>9</td>
</tr>
<tr>
<td>42-43</td>
<td>14</td>
<td>70-74</td>
<td>8</td>
</tr>
<tr>
<td>40-41</td>
<td>7</td>
<td>65-69</td>
<td>2</td>
</tr>
<tr>
<td>38-39</td>
<td>8</td>
<td>60-69</td>
<td>3</td>
</tr>
<tr>
<td>36-37</td>
<td>6</td>
<td>55-59</td>
<td>2</td>
</tr>
<tr>
<td>34-35</td>
<td>5</td>
<td>50-54</td>
<td>1</td>
</tr>
<tr>
<td>32-33</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum</td>
<td>68</td>
<td>Sum</td>
<td>65</td>
</tr>
</tbody>
</table>
Ans. (a) Men = -41.7, Median = 41.9, Mode = 42.5
     (b) Mean = 81.7, Median = 84.7, Mode = 87

<table>
<thead>
<tr>
<th>(c) Scores</th>
<th>f</th>
<th>(d) Scores</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>70-71</td>
<td>2</td>
<td>90-94</td>
<td>2</td>
</tr>
<tr>
<td>68-69</td>
<td>2</td>
<td>85-89</td>
<td>2</td>
</tr>
<tr>
<td>66-67</td>
<td>3</td>
<td>80-84</td>
<td>4</td>
</tr>
<tr>
<td>64-65</td>
<td>4</td>
<td>75-79</td>
<td>8</td>
</tr>
<tr>
<td>62-63</td>
<td>6</td>
<td>70-74</td>
<td>6</td>
</tr>
<tr>
<td>60-61</td>
<td>7</td>
<td>65-69</td>
<td>11</td>
</tr>
<tr>
<td>58-59</td>
<td>5</td>
<td>60-64</td>
<td>9</td>
</tr>
<tr>
<td>56-57</td>
<td>4</td>
<td>55-59</td>
<td>7</td>
</tr>
<tr>
<td>54-55</td>
<td>2</td>
<td>50-54</td>
<td>5</td>
</tr>
<tr>
<td>52-53</td>
<td>3</td>
<td>45-49</td>
<td>0</td>
</tr>
<tr>
<td>50-51</td>
<td>1</td>
<td>40-44</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N = 39</td>
<td></td>
</tr>
</tbody>
</table>

Ans. (c) Mean = 60.7, Median = 60.79, Mode = 60-85
     (d) Mean = 67.3, Median = 66.77, Mode = 65-59

<table>
<thead>
<tr>
<th>(e) Scores</th>
<th>f</th>
<th>(f) Scores</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>120-122</td>
<td>2</td>
<td>100-109</td>
<td>5</td>
</tr>
<tr>
<td>117-119</td>
<td>2</td>
<td>90-99</td>
<td>9</td>
</tr>
<tr>
<td>114-116</td>
<td>2</td>
<td>80-89</td>
<td>14</td>
</tr>
<tr>
<td>111-113</td>
<td>4</td>
<td>70-79</td>
<td>19</td>
</tr>
<tr>
<td>108-110</td>
<td>5</td>
<td>60-69</td>
<td>21</td>
</tr>
<tr>
<td>105-107</td>
<td>9</td>
<td>50-59</td>
<td>30</td>
</tr>
<tr>
<td>102-104</td>
<td>6</td>
<td>40-49</td>
<td>25</td>
</tr>
<tr>
<td>99-101</td>
<td>3</td>
<td>30-39</td>
<td>15</td>
</tr>
<tr>
<td>96-98</td>
<td>4</td>
<td>20-29</td>
<td>10</td>
</tr>
<tr>
<td>93-95</td>
<td>2</td>
<td>10-19</td>
<td>8</td>
</tr>
<tr>
<td>90-92</td>
<td>J</td>
<td>0-9</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N = 40</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(f) Scores</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-92</td>
<td>J</td>
</tr>
<tr>
<td>0-9</td>
<td>6</td>
</tr>
<tr>
<td>N = 162</td>
<td></td>
</tr>
</tbody>
</table>
### Introducing Education

#### Comparison of the Mean, Median and Mode

There is some benefit or the advantage or the other from the result of the Central Tendency as given above.

**Mean.** It is a measurement which is maximum known. It is also possible to have more understanding of it because even the students of a school have knowledge the idea of average. When there is Equal Probability of the presence of every multiplicant or Mean or every Mean or multiplicant has Equal Weight, then Mean is the correct appropriate or proper measurement or quantity, or result. The use of Mean is made in other methods of the statistics, such as, finding out the Mean Deviation or standard Deviation. Similarly, in co-relation as well as the Deviation of the Mean or multiplicant is found out. The only defect in it is that it is difficult to find it out by Arithmetical Method. The multiplicants of the limits also influence it. Most of the multiplicants are near about the group 40-60. Even then, if we take certain multiplicants near about 90-100 or 0-10, then Mean is likely to change. This is most dependable and reliable measurement of the Central Tendency.
Median. This is different from the Mean because the multiplicants of the limits do not cause much difference in it. There is very little influence of the multiplicants of limits on this particular measurement. Sometimes it is very easy to find it out. For example, if we have to determine the time of examination by finding out the average of the examination of 21 students, then in order to find out the Mean we shall have to add the time in hand and divide it by 21. But in order to find out the median we shall have to take the 21st multiplicand as the time by measuring the entire time. Even if the students are 20 only, there shall not be any difficulty. Then the central point or average point or Mean of the 10th-11th time can be easily arrived at by adding up the 10th and 11th time and dividing the result by 2.

Mode. This is not much in use, but on the basis of this, it is possible to have a general: imagination of the Central Tendency. It is also possible to find out the highest multiplicant through it.

We have already seen that almost all the statistical figures of some list are around the Mean. Supposes in a list there are three figures 19, 20 and 21. Then their Mean shall be \( \frac{19 + 20 + 21}{3} = 20 \) Hence figures other than the Mean are either one less or one more than it. In other words, the statistical figures of this table are near about the Mean.

Now take another list which has three figures 1, 20, 39. Its mean shall be \( \frac{1+20+30}{3} = 2 \) But the figures of this list are not around the Mean, because in the first list the difference between the average Mean and the other figures is only 1, while in the other list the figures are not near about the average Mean because here the difference between the average Mean and other figures is that of’ 19. Therefore, after finding out the average Mean it is necessary to find out the distance between the average Mean and other figures. It is then only that it can be said whether these figures are dependable or not. The knowledge of this distance can be found out by determining Mean Deviation and standard Deviation.

Mean or Average Deviation.

Mean Deviation, or MD is the arithmetic mean of all the deviations when we disregard the algebraic signs. Every figure or score or measurement in a distribution deviates from the mean. When and if any score coincides exactly with the mean, its deviation is zero. Deviation above the mean are regarded as positive distances, those below the mean as negative distances. In terms of algebraic definition,

\[ x = X - M \] (a deviation of a score from the mean) when \( X \) = an original score or measurement and \( M \) = the arithmetic mean.

In terms of a formula, \( AD \) or \( MD = (The \ average \ deviation) \)
INTRODUCING EDUCATION

Where \( |x| \) = an absolute value of \( x \) i.e., disregarding algebraic sign.

From the formula it will be seen that when we compute the average deviation we are interested merely in the size of the deviations from the mean. We ignore their direction.

The AD is an arithmetic mean of all the deviations of whatever size of direction. Like any arithmetic mean, it stands for all the values averaged.

**Example:** Calculate MD from the following scores:

Scores: 10, 15, 10, 20, 25, 15, 25, 20, 17, 23.

**Solution:**

<table>
<thead>
<tr>
<th>( X )</th>
<th>( X - M )</th>
<th>( X )</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10 - 18</td>
<td>-8</td>
</tr>
<tr>
<td>15</td>
<td>15 - 18</td>
<td>-3</td>
</tr>
<tr>
<td>10</td>
<td>10 - 18</td>
<td>-8</td>
</tr>
<tr>
<td>20</td>
<td>20 - 18</td>
<td>+2</td>
</tr>
<tr>
<td>25</td>
<td>25 - 18</td>
<td>+7</td>
</tr>
<tr>
<td>15</td>
<td>15 - 18</td>
<td>-3</td>
</tr>
<tr>
<td>25</td>
<td>25 - 18</td>
<td>+7</td>
</tr>
<tr>
<td>20</td>
<td>20 - 18</td>
<td>+2</td>
</tr>
<tr>
<td>17</td>
<td>17 - 18</td>
<td>-1</td>
</tr>
<tr>
<td>23</td>
<td>23 - 18</td>
<td>+5</td>
</tr>
</tbody>
</table>

\[ \Sigma X = 180 \]
\[ \Sigma x = 46(+23-23) \]

Mean Deviation = \( \frac{\Sigma/x}{N} \)

\[ \Sigma x = 46 \]
\[ x \text{ or } M = 18 \]
\[ N = 10 \]
\[ \therefore MD = \frac{46}{10} = 4.60 \]

**Example:** Calculate of AD from grouped data.

Formula: \( AD = \frac{\Sigma fx}{N} \)
Example : Calculate AD 1 from the following grouped date:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>f</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>28</td>
</tr>
</tbody>
</table>

Solution:

<table>
<thead>
<tr>
<th>Class</th>
<th>f</th>
<th>x’</th>
<th>fx’</th>
<th>Mid-Point</th>
<th>fx</th>
<th>X - M</th>
<th>fx</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-45</td>
<td>3</td>
<td>3</td>
<td>9</td>
<td>42</td>
<td>126</td>
<td>14-3</td>
<td>42-9</td>
</tr>
<tr>
<td>35-40</td>
<td>4</td>
<td>2</td>
<td>8</td>
<td>37</td>
<td>148</td>
<td>9-4</td>
<td>37-2</td>
</tr>
<tr>
<td>30-35</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>32</td>
<td>128</td>
<td>4-3</td>
<td>17-2</td>
</tr>
<tr>
<td>25-30</td>
<td>7</td>
<td>0</td>
<td>+21</td>
<td>27</td>
<td>189</td>
<td>0-7</td>
<td>4-9</td>
</tr>
<tr>
<td>20-25</td>
<td>5</td>
<td>-1</td>
<td>-5</td>
<td>22</td>
<td>110</td>
<td>5-7</td>
<td>28-5</td>
</tr>
<tr>
<td>15-20</td>
<td>3</td>
<td>-2</td>
<td>-6</td>
<td>17</td>
<td>5</td>
<td>10-7</td>
<td>32-1</td>
</tr>
<tr>
<td>10-15</td>
<td>2</td>
<td>-3</td>
<td>-6</td>
<td>12</td>
<td>24</td>
<td>15-7</td>
<td>31-4</td>
</tr>
</tbody>
</table>

\[ N = 28 \quad \Sigma fx = 4 \quad \Sigma fx = 194.2 \]

Mean = \[ \frac{\Sigma fx}{N} = \frac{776}{28} = 27.7 \] (Long method)

\[ \text{AD} = \frac{\Sigma fx}{N} = \frac{194.2}{28} = 6.9 \]

\[ \text{Mean} = \text{AM} + \frac{\Sigma fx}{N} \times i \] (short method)

\[ 77 + \frac{4}{28} \times 5 = 27.7 \]

\[ \text{AD} = \frac{\Sigma fx}{N} = 194.2/28 = 69 \]

**Standard Deviation**

The measurement that is mostly used in the measurements and standards of various things is Standard Deviation. Generally it is called SD. In order to find out the Standard Deviation, Deviations are square up or the square of the Deviation is taken and then their total is found out. Therefore, the question of signs does not arise here, because the square of the minus number is also positive. Here the signs of the Deviation are not required and so it is more scientific as compared to Mean Deviation in which the Deviations and their relative marks are added.
In order to find out the Standard Deviation, Deviations are squared up and their total is taken up. The then total is divided by the multiplicand figures and its square root is found out.

The Standard Deviation of ungrouped data shall be:

\[ \text{SD or } \sigma = \sqrt{\frac{\sum x^2}{N}} \]

Now we shall clarify this concept with the help of an example given below

<table>
<thead>
<tr>
<th>Multiplicant</th>
<th>Mean</th>
<th>Deviation from the mean</th>
<th>Square of the Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>44</td>
<td>16</td>
<td>245</td>
</tr>
<tr>
<td>52</td>
<td>44</td>
<td>8</td>
<td>64</td>
</tr>
<tr>
<td>47</td>
<td>44</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>33</td>
<td>44</td>
<td>-11</td>
<td>121</td>
</tr>
<tr>
<td>28</td>
<td>44</td>
<td>-16</td>
<td>256</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N = 5</td>
<td>?x^2 = 706</td>
</tr>
</tbody>
</table>

Hence, Standard Deviation = \( \sqrt{\frac{\sum x^2}{N}} \)

\[ = \sqrt{\frac{706}{5}} \]

\[ = \sqrt{141.2} \]

SD or \( \sigma = 11.88 \).

When the statistical data is divided into groups then the deviation of the multiplicants of the figures is not taken up. On the other hand, the Deviation of the central points of various groups or group spars is taken up. Then the deviations are squared up and then the total is multiplied by the frequency of the groups. Then all such products are added up and the total is divided by the multiplicant figure of the figures. Thereafter its square root is found out. Thus the Standard Deviation is arrived at.

The formula for this will be:

\[ \text{Standard Deviation} = \sigma = \sqrt{\frac{\sum fx^2}{N}} \]

Now we shall clarify this concept with the help of the solution of a question.
### Simple Method of Determining the Standard Deviation

The method of finding out the Deviation, given above, is lengthy and complicated. There is a simple method also, which is used to find it out.

In the simple method, the aid of Assumed Mean is taken. Generally it is the central figure of the group range of the middle or it is that central point or central figure of the group range of the middle or it is that central point or central figure of the group span which has the maximum frequency. Then the Deviation is not found out at the value of the figures or multiplicants. But they are taken on the basis of the units of the group spans, group ranges or groups. They are indicated by $x$ Then the square of these Deviations (or $x^2$) is taken and it is multiplied by the frequency of $f$. Then we shall form the products of $fx^2$.

Calculation of SD from the actual deviation.

**Formula:**

$$SD = \sigma = \sqrt{\frac{\Sigma x^2}{N}}$$

Calculate SD from the following data:

10, 15, 10, 20, 15, 25, 20, 17, 23
### Solution:

<table>
<thead>
<tr>
<th>$X$</th>
<th>$X - M = x$</th>
<th>$x^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10 - 18 = -8</td>
<td>64</td>
</tr>
<tr>
<td>15</td>
<td>15 - 18 = -3</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td>10 - 18 = -8</td>
<td>64</td>
</tr>
<tr>
<td>20</td>
<td>20 - 18 = +2</td>
<td>4</td>
</tr>
<tr>
<td>25</td>
<td>25 - 18 = +7</td>
<td>49</td>
</tr>
<tr>
<td>15</td>
<td>15 - 18 = -3</td>
<td>9</td>
</tr>
<tr>
<td>25</td>
<td>25 - 18 = +7</td>
<td>49</td>
</tr>
<tr>
<td>20</td>
<td>20 - 18 = +2</td>
<td>4</td>
</tr>
<tr>
<td>17</td>
<td>17 - 18 = -1</td>
<td>1</td>
</tr>
<tr>
<td>23</td>
<td>23 - 18 = +5</td>
<td>25</td>
</tr>
</tbody>
</table>

$\sum X = 180$  
$\sum x^2 = 278$

$N = 10$

$M = \frac{\sum x}{N} = \frac{180}{10} = 18$

$SD (\sigma) = \sqrt{\frac{\sum x^2}{N} - (\frac{\sum x}{N})^2}$

$SD (\sigma) = \sqrt{\frac{270}{10} - (\frac{180}{10})^2}$

$SD (\sigma) = \sqrt{27.8}$

Hence, $\sigma = 5.27$

Calculation of standard deviation from raw scores.

**Formula:**

$SD (\sigma) = \sqrt{N\sum x^2 - (\sum x)^2}$

Calculate SD from the following data:

8, 10, 11, 14, 13, 11, 15, 12, 12, 16

**Solution:**

<table>
<thead>
<tr>
<th>$X$</th>
<th>$x^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>64</td>
</tr>
<tr>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>11</td>
<td>121</td>
</tr>
<tr>
<td>14</td>
<td>196</td>
</tr>
<tr>
<td>13</td>
<td>169</td>
</tr>
<tr>
<td>11</td>
<td>121</td>
</tr>
<tr>
<td>15</td>
<td>225</td>
</tr>
<tr>
<td>12</td>
<td>144</td>
</tr>
<tr>
<td>12</td>
<td>144</td>
</tr>
<tr>
<td>12</td>
<td>256</td>
</tr>
</tbody>
</table>

$\sum x = 122$  
$\sum x^2 = 1540$
SD or \( \sigma = \frac{1}{N} \sqrt{N \sum x^2 - (\sum x)^2} \)

Here, \( N = 10 \) : \( \sum x^2 = 1540 \) and \( \sum x = 122 \)

\[
\frac{1}{10} \sqrt{10 \times 1540 - (122)^2} = \frac{1}{10} \sqrt{15400 - 14884} = \frac{1}{10} \sqrt{516}
\]

\[
\therefore \sigma = \frac{1}{10} = 22.716 = 2.2716 = 2.27
\]

Calculate SD from the following grouped data by the long method

f :  2  3  5  7  4  4  3

Solution :

<table>
<thead>
<tr>
<th>Score</th>
<th>f</th>
<th>Mid Point</th>
<th>fx</th>
<th>X- M</th>
<th>f x x</th>
<th>fx</th>
<th>x²</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-45</td>
<td>3</td>
<td>42</td>
<td>126</td>
<td>14-3</td>
<td>42-9</td>
<td>613-47</td>
<td></td>
</tr>
<tr>
<td>35-40</td>
<td>4</td>
<td>37</td>
<td>148</td>
<td>9-3</td>
<td>37-2</td>
<td>345-96</td>
<td></td>
</tr>
<tr>
<td>30-35</td>
<td>4</td>
<td>32</td>
<td>128</td>
<td>4-3</td>
<td>17-2</td>
<td>73-96</td>
<td></td>
</tr>
<tr>
<td>25-30</td>
<td>7</td>
<td>27</td>
<td>189</td>
<td>0-7</td>
<td>4-9</td>
<td>3-43</td>
<td></td>
</tr>
<tr>
<td>20-25</td>
<td>5</td>
<td>22</td>
<td>110</td>
<td>5-7</td>
<td>28-5</td>
<td>162-45</td>
<td></td>
</tr>
<tr>
<td>15-20</td>
<td>3</td>
<td>17</td>
<td>15</td>
<td>10-7</td>
<td>32-1</td>
<td>433-47</td>
<td></td>
</tr>
<tr>
<td>10-15</td>
<td>2</td>
<td>12</td>
<td>24</td>
<td>15-7</td>
<td>31-4</td>
<td>492-98</td>
<td></td>
</tr>
</tbody>
</table>

\[
N = 28 \quad \sum fx = 776 \quad \sum fx^2 = 2035.72
\]

\[
M = \frac{\sum fx}{N} = \frac{776}{29} = 27.7
\]

\[
\therefore SD or \sigma = \sqrt{\frac{\sum fx^2}{N}}
\]

Here, \( \sum fx^2 = 2035.72 \), \( N = 28 \), \( SD \sqrt{\frac{2035.75}{28}} = \sqrt{72.704} \)

Hence, \( a = 8-52 \).

Then all of them are added up and the total is divided by N or the figure multiplicand. Then the \( G^2 \) or the square of the assumed mean is subtracted from it and the square root of the figure that has been arrived at, is found out. Now the figure that has been thus arrived at is multiplied by the figure I (the multiplicand contained in the groups or groups ranges). Thus we arrive at a or Standard Deviation. This formula can be worked out like this:
This formula can be clarified with the help of the following example

<table>
<thead>
<tr>
<th>Groups</th>
<th>Central point (Average)</th>
<th>Frequency</th>
<th>Deviation $x'$</th>
<th>Frequency</th>
<th>Frequency X Deviation $fx$</th>
<th>Frequency $x^2$ Square of Deviation $fx^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>80-89</td>
<td>84-5</td>
<td>3</td>
<td>+4</td>
<td>12</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>70-79</td>
<td>74-5</td>
<td>5</td>
<td>+3</td>
<td>15</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>60-69</td>
<td>64-5</td>
<td>7</td>
<td>+2</td>
<td>14</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>50-59</td>
<td>54-5</td>
<td>5</td>
<td>+1</td>
<td>5</td>
<td>46</td>
<td>5</td>
</tr>
<tr>
<td>40-49</td>
<td>44-5</td>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>30-39</td>
<td>34-5</td>
<td>10</td>
<td>-1</td>
<td>-10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>24-5</td>
<td>4</td>
<td>-2</td>
<td>-8</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>10-19</td>
<td>14-5</td>
<td>5</td>
<td>-3</td>
<td>-15</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>0-9</td>
<td>4-5</td>
<td>5</td>
<td>-4</td>
<td>-20</td>
<td>53</td>
<td>80</td>
</tr>
</tbody>
</table>

$N = 55$, $Xfx = – 7$, $Efx^2 = 277$

Now:

$$\sigma = i\sqrt{\frac{\sum fx^2}{N} - G^2}, \text{ where } G = \frac{\sum fx}{N}$$

or,

$$\sigma = i\sqrt{\frac{\sum fx^2}{N} - \left(\frac{\sum fx}{N}\right)^2}$$

$$= 10\sqrt{\frac{27.7}{55} - \left(\frac{-7}{55}\right)}$$

$$= 10\sqrt{\frac{27.7}{55} - (0.127)^2}$$

$$= 10\sqrt{5.02} = 10 \times 2.24$$
Hence, SD ($\sigma$) = 22-4

This value we have found out more than once by a long method.

Calculate SD by short method from the following grouped data:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>f:</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

Solution:

<table>
<thead>
<tr>
<th>Score</th>
<th>f</th>
<th>X</th>
<th>fx</th>
<th>fx^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-45</td>
<td>3</td>
<td>-3</td>
<td>-9</td>
<td>27</td>
</tr>
<tr>
<td>35-40</td>
<td>4</td>
<td>-2</td>
<td>-8</td>
<td>16</td>
</tr>
<tr>
<td>30-35</td>
<td>4</td>
<td>-1</td>
<td>-4</td>
<td>4</td>
</tr>
<tr>
<td>25-30</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20-25</td>
<td>5</td>
<td>1</td>
<td>-5</td>
<td>5</td>
</tr>
<tr>
<td>15-20</td>
<td>3</td>
<td>2</td>
<td>-6</td>
<td>12</td>
</tr>
<tr>
<td>10-15</td>
<td>2</td>
<td>3</td>
<td>-6</td>
<td>18</td>
</tr>
</tbody>
</table>

\[ N = 28 \quad \text{Sfx} = +4 \quad \text{Sfx}^2 = 82 \]

\[ \text{SD} (\sigma) = i \sqrt{\frac{\sum fx^2}{N} - \left( \frac{\sum fx}{N} \right)^2} \]

Or \[ \frac{1}{N} \sqrt{\sum fx^2 N - \left( \sum fx \right)^2} \]

Here, \( l = 5 \), \( \sum fx = +4 \), \( \sum fx^2 = 82 \), \( N = 28 \)

\[ \therefore SD = 5 \sqrt{\frac{82}{28} - \left( \frac{4}{28} \right)^2} \]

\[ = 5 \sqrt{2.93 - \frac{16}{784}} \]

\[ = 5 \sqrt{2.93 - 0.02} = 5 \sqrt{2.91} \]

\[ = 5 \times 1.704 \]

Hence, \( a = 8.52 \)

NORMAL PROBABILITY CURVE

When we examine the results of the multiplicand of a group of examinees, elected at random, then we come across the following facts:
(i) There shall be a frequency of a particular result in the students.

(ii) The number of such students who have secured very meager marks shall be very small.

(iii) There shall be another frequency in which the number of the students shall be very small. In other words, the number of students who have secured high marks shall be very small.

This is not true about all examinations. Generally in subjects other than Mathematics and such other subjects, the result is like this.

In a model or ideal curve, the Mean and the average shall be, situated on one point. In other words, the mean, median and mode shall be laid on that very point. It means that the average result or average mark shall be somewhere near the central figure. The marks frequency shall be on this very figure. The shape of this particular curve shall be like a bell as given below:

![Normal Probability Curve](image)

This ideal curve is called Normal Probability Curve.

General Characteristics of Normal Probability Curve. In Normal Probability Curve, we arrive at the following facts:

(i) Its equation is

\[ y = \frac{Ne(-\frac{x^2}{2\sigma^2})}{\sigma\sqrt{2\pi}} \]

Here \( x \) and \( y \) are co-ordinates, \( \sigma \) is Standard Deviation and \( N \) is the total of the multiplicants or figures.

\[ \pi = 3.1416 \text{ or } \sqrt{\pi} = 2.51 \text{ and } e = 2.7183. \]
(ii) On both sides of the Mean, the Normal Probability Curve is almost bilaterally symmetrical.

(iii) In a Normal Probability Curve, the Mean, the average, and the median of the figures are situated on one point.

(iv) Skewness of the curve is found out by the following two formulae:

$$SK = \frac{3(Mean - Median)}{SD}$$

(Skewness) = $$\frac{P_{90} + P_{10}}{2} - P_{50}$$

When the median, mode and the Mean are equal, the value of both of the above formulae is equal to zero and the skewness of the Normal Probability Curve shall be zero.

(v) There is also a formula for determining the Kurtosis of the Normal Probability Curve.

$$Ku = \frac{q}{P_{90} - P_{10}}$$, where Q = $$\frac{1}{2} (Q_3 - Q_1)$$, $Q_1$ and $Q_3$ being first and third quartiles.

(vi) In Normal Probability Curve 68-26% of the figures or multiplicants fall under the total which is arrived at between the figures of the curves on the side and points between $+\sigma$ and $-\sigma$.

Similarly, 95% of the multiplicants of figures fall between $+1.96$ and $1.96$ and 99% of the figures fall between the figures of $+2.58\sigma$. Generally this percentage of the figures or multiplicants fall between $\pm 2.9\sigma$ and $\pm PE$.

(vii) Sometimes, the probability curve is not normal such as:

(a) If by chance the conditions of test are taken up by sampling, then the curve may be raised higher or may be flat.

(b) If the test is either too simple or too difficult, then the skewness that is arrived at may be raised higher or may be flat.

(c) If the test has not been framed properly then there shall be some mistakes in conducting the examination.

**Educational Value of Normal Probability Curve.**

Normal Probability Curve has the educational value also. This value is in the following respects:
(a) If the probability Curve is ideal, the test shall be called good. But if the curved line is not ideal, the test cannot be called free from faults and defects. Therefore, the Probability curve line is helpful in finding out the correctness, importance, and utility of the test.

(b) It is also helpful in knowing the relative difference of the questions of tests. This knowledge is useful and necessary.

(c) Through this normal distribution or division, we can also know other sub-divisions and sub-groups.

The teacher is anxious sometimes to find out the Co-Relation of the marks that a student has to secure in the one subject with that of the marks of the other subjects. When a student has secured good marks in one subjects and similarly good marks in other subjects also. In ‘Statistics’ this Co-Relation is termed as ‘+1’. On the other hand, if a student has secured more marks in one subject and less marks in other subject, then this Co-Relation is termed as -T. When there is no Co-Relation between the marks secured in two subjects, this CO-Relation is termed as ‘O’. In short, it can be said that under no condition the Co-Relation can be more than ±1.

**Forms of Co-Relation**

These Co-Relations are of three types as given below;

(i) Positive Co-Relation. When an individual or a group of individuals has secured equal marks in two different examinations, then this Co-Relationship is termed as ‘Positive Co-Relation’. Co-Relationship can vary from 0 to +1. +1 is called Perfect Positive Co-Relation.

(ii) Negative Co-Relation. If an individual or a group of individuals secures highest marks in one examination and lowest marks in other examinations, then it is termed as ‘Negative Co-Relation’. This Co-Relation may run from 0 to -1. -1 is called Perfect Negative Co-Relation.

(iii) Zero Co-Relation. If there is no relationship between the marks secured at one examination and the marks secured at other examinations, then this relationship is termed as ‘Zero Co-Relation’. This is written as ‘00’.

**Importance of Co-Efficient of Co-Relation**

Co-Efficient of Co-Relation is very important for the teachers, discoverers and those engaged in the task of research. With the help of Co-Efficient of Co-Relation it is possible to have a correct idea of the working capacity of a person. With the help of this, it is also
possible to have a knowledge of the various qualities of an individual. After finding out the Co-Relation between the two qualities or different qualities of an individual, it is also possible to provide him with Vocational Guidance. In order to provide counseling to a student, in selection of his subjects of study, Co-Efficient of Co-Relation is also helpful and necessary. With the help of this, it is possible to suggest to the student the subjects that would suit his working capacity and aptitude.

**Method to find out the Co-Relation**

The problem of finding out the Co-Efficient of Co-Relation is also quite difficult. Various have suggested various methods for finding it out. Two methods, that are prevalent and important, are given below:

1. Rank Order Method
2. Product Moment Method

Rank order method was found out by Spearman. It is said to be the easiest method of finding out the Co-Efficient of Co-Relationship. In order to give a practical shape to this method, the following activities have to be performed:

(i) First of all the marks secured by the student in two subjects are keenly observed. Out of the marks secured, position one is written before the highest marks. Position two is written before the next and position three is written before the marks lower to the second. Similarly, other positions are indicated. The example given below will clarify and elucidate its working.

(ii) After having finished the first stage of the activity, the second stage starts. In the second stage of the process the difference between the positions of the marks secured in two subjects is found out. In finding out the difference the signs of + and - are not used. This activity will also be clear from the example given below.

**Example:**

<table>
<thead>
<tr>
<th>Student</th>
<th>Marks of Arithmetic</th>
<th>Marks of Literature</th>
<th>Order of the position</th>
<th>Order of the position or Literure</th>
<th>Different between the order of the position of subject</th>
<th>(Difference) D</th>
<th>( \sum D^2 = 16 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>22</td>
<td>18</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>18</td>
<td>15</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>19</td>
<td>17</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>15</td>
<td>16</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>17</td>
<td>19</td>
<td>4</td>
<td>1</td>
<td>.3</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
(iii) After putting on record the difference, the squares of the difference are also put down. Then the squares of the difference are added.

(iii) After this, by using the formula of Spearman is given below:

Here, while indicating the difference, the signs of + or - have not been used. Now let us try to examine and clarify the formula of Spearman:

\[ D^2 = \text{the sum of the squares of the differences in the position of the marks secured in two subjects.} \]

\[ N = \text{The number of students.} \]

Hence, \[ \rho = 1 - \frac{6 \sum D^2}{N(N^2-1)} \]

Here, \( N = 5 \) and \( \sum D^2 = 16 \)

i.e. \( \rho = 1 - \frac{6 \times 16}{5(25-1)} \)

\[ = \frac{120 - 96}{120} \]

or \( \rho = \frac{24}{120} \)

or \( \rho = .2 \)

It means that there is a Positive Relationship.

**Product Moment Method**

In the use of this Method the following activities are performed and then with the use of the formula the Co-Relation is found out. Let us now examine the various activities that are performed.

(i) The average of the marks secured in two subjects is found out.

(ii) Afterwards the difference between the marks secured in two subjects and their average is put down.

(iii) After this, the difference between the two subjects is squared up.

(iv) Then the multiplication of the differences is written down.
(v) Afterwards addition of the marks, their difference, the squares of the difference and multiplication of the differences is added up.

(vi) Then the formula, given below is used and the Co-Relationship is found out.

This shall be clear from the example given below:

<table>
<thead>
<tr>
<th>Student</th>
<th>Marks of Arithmetic</th>
<th>Marks of Literature</th>
<th>Difference between the marks and the average of the marks of Arithmetic</th>
<th>Difference of the marks and the average of literature</th>
<th>Square of the difference of the marks of Arithmetic</th>
<th>Square of the difference of the marks of literature</th>
<th>Difference of Arithmetic &amp; the difference of literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>22</td>
<td>18</td>
<td>+2</td>
<td>+1</td>
<td>4</td>
<td>1</td>
<td>+2</td>
</tr>
<tr>
<td>B</td>
<td>18</td>
<td>15</td>
<td>0</td>
<td>-2</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>C</td>
<td>19</td>
<td>17</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>D</td>
<td>15</td>
<td>16</td>
<td>-3</td>
<td>-1</td>
<td>9</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>E</td>
<td>18</td>
<td>19</td>
<td>0</td>
<td>+2</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>90</td>
<td>85</td>
<td>0</td>
<td>14</td>
<td>10</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

The formula is like this: \[ r = \frac{\sum xy}{\sqrt{\sum xa^2 \cdot \sum xb^2}} \]

Here x stands for the difference in the marks and the average of Arithmetic and y stands for the difference in the marks and the average of literature. \( xy \) stands for the sum of the products of these differences.

Now on the basis of the above example we can use the formula as given below:

\[ r = \frac{\sum xy}{\sqrt{\sum xa^2 \cdot \sum xb^2}} \]

Or \[ r = \frac{5}{\sqrt{14 \times 10}} = \frac{5}{2\sqrt{35}} = \frac{\sqrt{5}}{2\sqrt{7}} \]

\[ = \frac{1}{2} \sqrt{\frac{5}{7}} = \frac{1}{2} \sqrt{0.7143} \]

\[ = \frac{1}{2} \times 0.84 = 0.42 \]
Example:

Find the Co-Relation between the two sets of scores given below, using the ratio methods;

<table>
<thead>
<tr>
<th>Students</th>
<th>Subject (x)</th>
<th>Subject (y)</th>
<th>x</th>
<th>y</th>
<th>x²</th>
<th>y²</th>
<th>xy</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>85</td>
<td>65</td>
<td>6-5</td>
<td>5-6</td>
<td>42-25</td>
<td>31-36</td>
<td>36-40</td>
</tr>
<tr>
<td>B</td>
<td>72</td>
<td>58</td>
<td>-6-5</td>
<td>-1-4</td>
<td>-42-25</td>
<td>1-96</td>
<td>9-10</td>
</tr>
<tr>
<td>C</td>
<td>75</td>
<td>55</td>
<td>-3-5</td>
<td>-4-4</td>
<td>12-25</td>
<td>19-36</td>
<td>15-40</td>
</tr>
<tr>
<td>D</td>
<td>82</td>
<td>59</td>
<td>3-5</td>
<td>-4</td>
<td>12-25</td>
<td>16</td>
<td>-1-40</td>
</tr>
<tr>
<td>E</td>
<td>75</td>
<td>63</td>
<td>-3-5</td>
<td>3-6</td>
<td>12-25</td>
<td>12-96</td>
<td>-12-60</td>
</tr>
<tr>
<td>F</td>
<td>80</td>
<td>56</td>
<td>1-5</td>
<td>-3-4</td>
<td>2-25</td>
<td>11-56</td>
<td>-5-10</td>
</tr>
<tr>
<td>G</td>
<td>83</td>
<td>62</td>
<td>4-5</td>
<td>2-6</td>
<td>6-25</td>
<td>6-76</td>
<td>11-70</td>
</tr>
<tr>
<td>H</td>
<td>76</td>
<td>57</td>
<td>-2-5</td>
<td>-2-4</td>
<td>6-25</td>
<td>5-76</td>
<td>6-00</td>
</tr>
</tbody>
</table>

\[ \sum x^2 = 150.00 \quad \sum y^2 = 89.88 \quad \sum xy = 59.50 \]

\[ M_x = 78.5 \quad M_y = 59.4 \]

\[ \sigma_x = 4.3 \quad \sigma_y = 3.5 \]

\[ r = \frac{\sum xy}{\sqrt{\sum x^2 \cdot \sum y^2}} \]

\[ = \frac{59.50}{\sqrt{150.00 \times 89.88}} \]

\[ = \frac{59.50}{\sqrt{13482}} = \frac{59.50}{116.1} = .51 \]

Example:

<table>
<thead>
<tr>
<th>Students</th>
<th>Subject (x)</th>
<th>Subject (y)</th>
<th>x</th>
<th>y</th>
<th>x²</th>
<th>y²</th>
<th>xy</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>85</td>
<td>65</td>
<td>5</td>
<td>5</td>
<td>25</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>B</td>
<td>72</td>
<td>58</td>
<td>-8</td>
<td>-2</td>
<td>64</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>C</td>
<td>75</td>
<td>55</td>
<td>-5</td>
<td>-5</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>D</td>
<td>82</td>
<td>59</td>
<td>2</td>
<td>-1</td>
<td>4</td>
<td>1</td>
<td>-2</td>
</tr>
<tr>
<td>E</td>
<td>75</td>
<td>63</td>
<td>-5</td>
<td>3</td>
<td>25</td>
<td>9</td>
<td>-15</td>
</tr>
<tr>
<td>F</td>
<td>80</td>
<td>56</td>
<td>0</td>
<td>-4</td>
<td>0</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>G</td>
<td>83</td>
<td>62</td>
<td>3</td>
<td>2</td>
<td>9</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>H</td>
<td>76</td>
<td>57</td>
<td>-4</td>
<td>-3</td>
<td>16</td>
<td>9</td>
<td>12</td>
</tr>
</tbody>
</table>

\[ \sum x^2 = 168 \quad \sum y^2 = 93 \quad \sum xy = 67 \]

\[ (\sum x^2) \quad (\sum y^2) \quad (\sum xy) \]
Amx = 80
Cx = − 1.5

\[ Cx = \sqrt{\frac{168}{8} - 2.25} = Cy = \sqrt{\frac{93}{8} - .397} \]
\[ = 4.33 \quad = 3.34 \]

\[ r = \frac{\frac{67}{8} - (-1.5)(-0.63)}{4.33 \times 3.35} = \frac{7.43}{14.51} = .51 \]

Find the Co-Relation between the two sets of Scores given below, using the ration method:

<table>
<thead>
<tr>
<th>(a)</th>
<th>x</th>
<th>y</th>
<th>(b)</th>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>5</td>
<td></td>
<td>20</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>6</td>
<td></td>
<td>25</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>8</td>
<td></td>
<td>14</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>2</td>
<td></td>
<td>11</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>5</td>
<td></td>
<td>2</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>4</td>
<td></td>
<td>38</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>1</td>
<td></td>
<td>16</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>7</td>
<td></td>
<td>14</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>10</td>
<td></td>
<td>23</td>
<td>25</td>
<td></td>
</tr>
</tbody>
</table>

Ans. (a) \( r = -0.16 \)  \( \quad \) (b) \( r = -0.47 \)

3. Calculate the Co-Efficient of Co-Relation between the two sets of scores given below, using the ratio method:

<table>
<thead>
<tr>
<th>(a)</th>
<th>x</th>
<th>y</th>
<th>(b)</th>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>24</td>
<td></td>
<td>10</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>22</td>
<td></td>
<td>4</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>44</td>
<td></td>
<td>11</td>
<td>76</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>72</td>
<td></td>
<td>6</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>25</td>
<td></td>
<td>2</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>30</td>
<td></td>
<td>9</td>
<td>61</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>38</td>
<td></td>
<td>17</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>54</td>
<td>6</td>
<td>61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>37</td>
<td>4</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>61</td>
<td>25</td>
<td>61</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ans. (a) \( r = -0.18 \)  \( \quad \) (b) \( r = -0.479 \)
GROUP - B

HISTORICAL DEVELOPMENT
(POST-INDEPENDENT PERIOD)
EDUCATIONAL PROVISIONS IN THE INDIAN CONSTITUTION

Education in India is provided by the public sector as well as the private sector, with control and funding coming from three levels: central, state, and local. Takshasila was the earliest recorded centre of higher learning in India from at least 5th century BCE and it is debatable whether it could be regarded a university or not. The Nalanda University was the oldest university-system of education in the world in the modern sense of university. Western education became ingrained into Indian society with the establishment of the British Raj.

Education in India falls under the control of both the Union Government and the State Governments, with some responsibilities lying with the Union and the states having autonomy for others. The various articles of the Indian Constitution provide for education as a fundamental right. Most universities in India are controlled by the Union or the State Governments.

India has made progress in terms of increasing the primary education attendance rate and expanding literacy to approximately three quarters of the population. India’s improved education system is often cited as one of the main contributors to the economic rise of India. Much of the progress, especially in higher education and scientific research, has been credited to various public institutions. The private education market in India was 5% and in terms of value was estimated to be worth US$40 billion in 2008 but had increased to US$68-70 billion by 2012.

As per the Annual Status of Education Report (ASER) 2012, 96.5% of all rural children between the ages of 6-14 were enrolled in school. This is the fourth annual survey to report enrollment above 96%. 83% of all rural 15-16 year olds were enrolled in school. However, going forward, India will need to focus more on quality.

Gross enrollment at the tertiary level has crossed 20% (as per an Ernst & Young Report cited in Jan 2013 in Education News/minglebox.com)

As per the latest (2013) report issued by the All India Council of Technical Education (AICTE), there are more than 3524 diploma and post-diploma offering institutions in the country with an annual intake capacity of over 1.2 million.

The AICTE also reported 3495 degree-granting engineering colleges in India with an annual student intake capacity of over 1.76 million with actual enrollment crossing 1.2 million.
Capacity for Management Education crossed 385000, and post graduate degree slots in Computer Science crossed 100,000. Pharmacy slots reached over 121,000.

Total annual intake capacity for technical diplomas and degrees exceeded 3.4 million in 2012.

According to the University Grants Commission (UGC) total enrollment in Science, Medicine, Agriculture and Engineering crossed 6.5 million in 2010.

Charu Sudan Kasturi reported in the Hindustan Times (New Delhi, 10 January 2011) that the number of women choosing engineering has more than doubled since 2001.

In the Indian education system, a significant number of seats are reserved under affirmative action policies for the historically disadvantaged, scheduled Castes and scheduled tribes and other Backward Classes. In universities/colleges/institutions affiliated to the federal government there is a minimum 50% of reservations applicable to these disadvantaged groups, at the state level it can vary. Andhra Pradesh had 83.33% reservation in 2012, which is the highest percentage of reservations in India.

Brahmin gurus historically offered education by means of donations, rather than charging fees or the procurement of funds from students or their guardians. Later, temples also became centres of education; religious education was compulsory, but secular subjects were also taught. Students were required to be brahmacharis or celibates. The knowledge in these orders was often related to the tasks a section of the society had to perform. The priest class, the Brahmmins, were imparted knowledge of religion, philosophy, and other ancillary branches while the warrior class, the Kshatriya, were trained in the various aspects of warfare. The business class, the Vaishya, were taught their trade and the working class or the Shudras were generally deprived of educational advantages. The book of laws, the Manusmriti, and the treatise on statecraft the Arthashastra were among the influential works of this era which reflect the outlook and understanding of the world at the time.

Secular institutions cropped up along with Hindu temples, mutts and Buddhist monasteries. These institutions imparted practical education, e.g. medicine. A number of urban learning centres became increasingly visible from the period between 500 BCE to 400 CE. The important urban centres of learning were Taxila (in modern day Pakistan) and Nalanda in Bihar, among others. These institutions systematically imparted knowledge and attracted a number of foreign students to study topics such as Vedic and Buddhist literature, logic, grammar, etc. Chanakya, a Brahmin teacher, was among the most famous teachers of Takshasila, associated with founding of Mauryan Empire.

India’s education system is divided into different levels such as pre-primary level, primary level, elementary education, secondary education, undergraduate level and postgraduate level.[7] The National Council of Educational Research and Training (NCERT) is the apex body for curriculum related matters for school education in India.[8] The NCERT provides
support and technical assistance to a number of schools in India and oversees many aspects of enforcement of education policies. In India, the various curriculum bodies governing school education system are:

- The state government boards, in which the majority of Indian children are enrolled. The Central Board of Secondary Education (CBSE). CBSE conducts two examinations, namely, the All India Secondary School Examination, AISSE (Class/Grade 10) and the All India Senior School Certificate Examination, AISSCE (Class/Grade 12).
- The Council for the Indian School Certificate Examinations (CISCE). CISCE conducts three examinations, namely, the Indian Certificate of Secondary Education (ICSE - Class/Grade 10); The Indian School Certificate (ISC - Class/Grade 12) and the Certificate in Vocational Education (CVE - Class/Grade 12).
- The National Institute of Open Schooling (NIOS) conducts two examinations, namely, Secondary Examination and Senior Secondary Examination (All India) and also some courses in Vocational Education.
- International schools affiliated to the International Baccalaureate Programme and/or the Cambridge International Examinations.
- Islamic Madrasah schools, whose boards are controlled by local state governments, or autonomous, or affiliated with Darul Uloom Deoband.

In addition, NUEPA (National University of Educational Planning and Administration) and NCTE (National Council for Teacher Education) are responsible for the management of the education system and teacher accreditation.

The central and most state boards uniformly follow the “10+2+3” pattern of education. In this pattern, or in colleges), and then 3 years of college education for bachelor’s degree. The 10 years is further divided into 5 years of primary education and 3 years of upper primary, followed by 2 years of high school. This pattern originated from the recommendation the Education Commission of 1964-66.

**Primary education system in India**

The Indian government lays emphasis on primary education up to the age of fourteen years, referred to as elementary education in India. The Indian government has also banned child labour in order to ensure that the children do not enter unsafe working conditions. However, both free education and the ban on child labour are difficult to
INTRODUCING EDUCATION

enforce due to economic disparity and social conditions. [15] 80% of all recognized schools at the elementary stage are government run or supported, making it the largest provider of education in the country. [16]

However, due to a shortage of resources and lack of political will, this system suffers from massive gaps including high pupil to teacher ratios, shortage of infrastructure and poor levels of teacher training. Figures released by the Indian government in 2011 show that there were 5,816,673 elementary school teachers in India. As of March 2012 there were 2,127,000 secondary school teachers in India. Education has also been made free[15] for children for 6 to 14 years of age or up to class VIII under the Right of Children to Free and Compulsory Education Act 2009.

There have been several efforts to enhance quality made by the government. The District Education Revitalization Programme (DERP) was launched in 1994 with an aim to universalize primary education in India by reforming and vitalizing the existing primary education system. [20] 85% of the DERP was funded by the central government and the remaining 15 percent was funded by the states. [20] The DERP, which had opened 160000 new schools including 84000 alternative education schools delivering alternative education to approximately 3.5 million children, was also supported by UNICEF and other international programmes. [20]

This primary education scheme has also shown a high Gross Enrollment Ratio of 93-95% for the last three years in some states. [20] Significant improvement in staffing and enrollment of girls has also been made as a part of this scheme. [20] The current scheme for universalization of “Education for All” is the “Sarva Shiksha Abhiyan” which is one of the largest education initiatives in the world. Enrollment has been enhanced, but the levels of quality remain low.

Private education:

In India, due to the British influence, a public school implies a non-governmental, historically elite educational institution, often modeled on British public schools which are in certain cases governmental. There are privately owned and managed schools, many of whom have the appellation “Public” attached to them, e.g. the Delhi Public Schools, or Frank Anthony Public Schools. Most middle-class families send their children to such schools, which might be in their own city or distant boarding school such as Rajkumar College, Rajkot, the oldest public school in India. The medium of education is English, but Hindi and/or the state’s official language is also taught as a compulsory subject. Preschool education is mostly limited to organised neighbourhood nursery schools with some organised chains.

According to current estimates, 80% of all schools are government schools making the government the major provider of education. However, because of poor quality of public education, 27% of Indian children are privately educated. With more than 50% children
Enrolling in private schools in urban areas, the balance has already tilted towards private schooling in cities; even in rural areas, nearly 20% of the children in 2004-5 were enrolled in private schools. [22] According to some research, private schools often provide superior results at a multiple of the unit cost of government schools. However, others have suggested that private schools fail to provide education to the poorest families, a selective being only a fifth of the schools and have in the past ignored Court orders for their regulation.

In their favour, it has been pointed out that private schools cover the entire curriculum and offer extra-curricular activities such as science fairs, general knowledge, sports, music and drama. The pupil teacher ratios are much better in private schools (1:31 to 1:37 for government schools) and more teachers in private schools are female. There is some disagreement over which system has better educated teachers. According to the latest DISE survey, the percentage of untrained teachers (parateachers) is 54.91% in private, compared to 44.88% in government schools and only 2.32% teachers in unaided schools receive inservice training compared to 43.44% in government schools. The competition in the school market is intense, yet most schools make profit. However, the number of private schools in India is still low - the share of private institutions is 7% (with upper primary being 21% and secondary 32% - source : fortress team research). MG English International School Bagru is one of the leading schools in India that is imparting world class education in the countryside area of Rajasthan.

Even the poorest often go to private schools despite the fact that government schools are free. A study found that 65% of schoolchildren in Hyderabad’s slums attend private schools.

**Homeschooling:**

Homeschooling is legal in India, though it is the least explored option. The Indian Government’s stance on the issue is that parents are free to teach their children at home, if they wish to and have the means. HRD Minister Kapil Sibal has stated that despite the RTE Act of 2009, if someone decides not to send his/her children to school, the government would not interfere.

**Secondary education:**

The National Policy on Education (NPE), 1986, has provided for environment awareness, science and technology education, and introduction of traditional elements such as Yoga into the Indian secondary school system. Secondary education covers children 14-18 which covers 88.5 million children according to the Census, 2001.

A significant feature of India’s secondary school system is the emphasis on inclusion of the disadvantaged sections of the society. Professionals from established institutes are often called to support in vocational training. Another feature of India’s secondary school system is its emphasis on profession based vocational training to help students attain skills for
finding a vocation of his/her choosing. A significant new feature has been the extension of SSA to secondary education in the form of the Madhyamik Shiksha Abhiyan

A special Integrated Education for Disabled Children (IEDC) programme was started in 1974 with a focus on primary education, but which was converted into Inclusive Education at Secondary Stage. Another notable special programme, the Kendriya Vidyalaya project, was started for the employees of the central government of India, who are distributed throughout the country. The government started the Kendriya Vidyalaya project in 1965 to provide uniform education in institutions following the same syllabus at the same pace regardless of the location to which the employee’s family has been transferred.

**Higher education:**

Our university system is, in many parts, in a state of despair...In almost half the districts in the country, higher education enrollments are abysmally low, almost two-third of our universities and 90 per cent of our colleges are rated as below average on quality parameters... I am concerned that in many states university appointments, including that of vice-chancellors, have been politicised and have become subject to caste and communal considerations, there are complaints of favouritism and corruption.

After passing the Higher Secondary Examination (the grade 12 examination), students may enroll in general degree programmes such as bachelor’s degree in arts, commerce or science, or professional degree programmes such as engineering, law or medicine. India’s higher education system is the third largest in the world, after China and the United States. The main governing body at the tertiary level is the University Grants Commission (India), which enforces its standards, advises the government, and helps coordinate between the centre and the state. Accreditation for higher learning is overseen by 12 autonomous institutions established by the University Grants Commission. In India, education system is reformed. In the future, India will be one of the largest education hubs.

As of 2009, India has 20 central universities, 215 state universities, 100 deemed universities, 5 institutions established and functioning under the State Act, and 33 institutes which are of national importance. Other institutions include 16,000 colleges, including 1,800 exclusive women’s colleges, functioning under these universities and institutions. The emphasis in the tertiary level of education lies on science and technology. Indian educational institutions by 2004 consisted of a large number of technology institutes. Distance learning is also a feature of the Indian higher education system. The Government has launched Rashtriya Uchattar Shiksha Abhiyan to provide strategic funding to State higher and technical institutions. A total of 316 state public universities and 13,024 colleges will be covered under it. [38]

Some institutions of India, such as the Indian Institutes of Technology (IITs), have been globally acclaimed for their standard of undergraduate education in engineering. The IITs
Educational Provisions in the Indian Constitution

Enroll about 10,000 students annually and the alumni have contributed to both the growth of the private sector and the public sectors of India. However the IIT’s have not had significant impact on fundamental scientific research and innovation. Several other institutes of fundamental research such as the Indian Association for the Cultivation of Science (IACS), Indian Institute of Science (IISc), Tata Institute of Fundamental Research (TIFR), Harishchandra Research Institute (HRI), are acclaimed for their standard of research in basic sciences and mathematics. However, India has failed to produce world class universities both in the private sector or the public sector.

Besides top rated universities which provide highly competitive world class education to their pupils, India is also home to many universities which have been founded with the sole objective of making easy money. Regulatory authorities like UGC and AICTE have been trying very hard to extirpate the menace of private universities which are running courses without any affiliation or recognition. Indian Government has failed to check on these education shops, which are run by big businessmen & politicians. Many private colleges and universities do not fulfill the required criterion by the Government and central bodies (UGC, AICTE, MCI, BCI etc.) and take students for a ride. For example, many institutions in India continue to run unaccredited courses as there is no legislation strong enough to ensure legal action against them. Quality assurance mechanism has failed to stop misrepresentations and malpractices in higher education. At the same time regulatory bodies have been accused of corruption, specifically in the case of deemed-universities. In this context of lack of solid quality assurance mechanism, institutions need to step-up and set higher standards of self-regulation.

The Government of India is aware of the plight of higher education sector and has been trying to bring reforms, however, 15 bills are still awaiting discussion and approval in the Parliament. One of the most talked about bill is Foreign Universities Bill, which is supposed to facilitate entry of foreign universities to establish campuses in India. The bill is still under discussion and even if it gets passed, its feasibility and effectiveness is questionable as it misses the context, diversity and segment of international foreign institutions interested in India.[44] One of the approaches to make internationalization of Indian higher education effective is to develop a coherent and comprehensive policy which aims at infusing excellence, bringing institutional diversity and aids in capacity building.

Three Indian universities were listed in the Times Higher Education list of the world’s top 200 universities — Indian Institutes of Technology, Indian Institutes of Management, and Jawaharlal Nehru University in 2005 and 2006. Six Indian Institutes of Technology and the Birla Institute of Technology and Science - Pilani were listed among the top 20 science and technology schools in Asia by Asiaweek. The Indian School of Business situated in Hyderabad was ranked number 12 in global MBA rankings by the Financial Times of London in 2010 while the All India Institute of Medical Sciences has been recognized as a global leader in medical research and treatment.
**Technical education**

The number of graduates coming out of technical colleges increased to over 700,000 in 2011 from 550,000 in FY 2010. However, according to one study, 75% of technical graduates and more than 85% of general graduates are unemployable by India’s most demanding and high-growth global industries, including information technology. Nevertheless, that still means that India offers the largest pool of technically skilled graduates in the world.

From the first Ist Five year Plan onwards, India’s emphasis was to develop a pool of scientifically inclined manpower. India’s National Policy on Education (NPE) provisioned for an apex body for regulation and development of higher technical education, which came into being as the All India Council for Technical Education (AICTE) in 1987 through an act of the Indian parliament. At the federal level, the Indian Institutes of Technology, the Indian Institute of Space Science and Technology, the National Institutes of Technology and the Indian Institutes of Information Technology, Rajiv Gandhi Institute of Petroleum Technology are deemed of national importance.

The Indian Institutes of Technology are among the nation’s premier education facilities. Since 2002, Several Regional Engineering Colleges (RECs) have been converted into National Institutes of Technology giving them Institutes of National Importance status.

The Rajiv Gandhi Institute of Petroleum Technology: The Ministry of Petroleum and Natural Gas (MOP&NG), Government of India set up the institute at Jais, Rae Bareli district, Uttar Pradesh through an Act of Parliament. RGIPT has been accorded “Institute of National Importance” along the lines of the Indian Institute of Technology (IIT), Indian Institute of Management (IIM) and National Institute Of Technology (NIT). With the status of a Deemed University, the institute awards degrees in its own right.

The UGC has inter-university centres at a number of locations throughout India to promote common research, e.g. the Nuclear Science Centre at the Jawaharlal Nehru University, New Delhi. Besides there are some British established colleges such as Harcourt Butler Technological Institute situated in Kanpur and King George Medical University situated in Lucknow which are important centre of higher education.

Central Universities such as Banaras Hindu University, Jamia Millia Islamia University, Delhi University, Mumbai University, University of Calcutta, etc. are too pioneers of technical education in the country.

In addition to the above institutes, efforts towards the enhancement of technical education are supplemented by a number of recognized Professional Engineering Societies such as

1. Institution of Mechanical Engineers (India)
2. Institution of Engineers (India)
3. Institution of Chemical Engineering (India)
4. Institution of Electronics and Tele-Communication Engineers (India)
5. Indian Institute of Metals
6. Institution of Industrial Engineers (India)
7. Institute of Town Planners (India)
8. Indian Institute of Architects
9. Birla Institute of Technology and Science, Pilani

that conduct Engineering/Technical Examinations at different levels (Degree and diploma) for working professionals desirous of improving their technical qualifications.

In addition to recognized institutes for technical education there are many private technical institutes such as

1. NIIT
2. The Tourism School

**Open and distance learning**

At school level, National Institute of Open Schooling (NIOS) provides opportunities for continuing education to those who missed completing school education. 14 lakh students are enrolled at the secondary and higher secondary level through open and distance learning. In 2012 Various state government also introduce “STATE OPEN SCHOOL” to provide distance education. [56]

At higher education level, Indira Gandhi National Open University (IGNOU) co-ordinates distance learning. It has a cumulative enrolment of about 15 lakhs, serviced through 53 regional centres and 1,400 study centres with 25,000 counsellors. The Distance Education Council (DEC), an authority of IGNOU is co-coordinating 13 State Open Universities and 119 institutions of correspondence courses in conventional universities. While distance education institutions have expanded at a very rapid rate, most of these institutions need an upgradation in their standards and performance. There is a large proliferation of courses covered by distance mode without adequate infrastructure, both human and physical. There is a strong need to correct these imbalances.

Arjun Singh Centre for Distance and Open Learning, Jamia Millia Islamia University was established with the assistance of Distance Education Council in September 2002. Major objectives of the Centre is to provide opportunities for higher education to those who are not able to draw benefits from formal system of education. The Open Learning System allows a learner to determine his pace of learning and provide education at the doorstep of the learner. The mode of transaction is through self-learning print material, supplemented by audio and video programmes. It has further scope of students accessing material through internet and various other media.
**Literacy**

According to the Census of 2011, “every person above the age of 7 years who can read and write in any language is said to be literate”. According to this criterion, the 2011 survey holds the National Literacy Rate to be around 74.07%. Government statistics of 2001 also hold that the rate of increase in literacy is more in rural areas than in urban areas. Female literacy was at a national average of 65% whereas the male literacy was 82%. Within the Indian states, Kerala has shown the highest literacy rates of 93% whereas Bihar averaged 63.8% literacy. The 2001 statistics also indicated that the total number of ‘absolute non-literates’ in the country was 304 million.

The Economist reports that half of 10-year-old rural children could not read at a basic level, over 60% were unable to do division, and half dropped out by the age 14. An optimistic estimate is that only one in five job-seekers in India has ever had any sort of vocational training. However, this figure is likely to be much higher in 2013.

**Higher education**

As per Report of the Higher education in India, Issues Related to Expansion, Inclusiveness, Quality and Finance, the access to higher education measured in term of gross enrolment ratio increased from 0.7% in 1950/51 to 1.4% in 1960-61. By 2006/7 the GER increased to about 11 percent. Notably, by 2012, it had crossed 20% (as mentioned in an earlier section).

**Women’s education**

Women have a much lower literacy rate than men. Far fewer girls are enrolled in the schools, and many of them drop out. In the patriarchal setting of the Indian family, girls have lower status and fewer privileges than boy children. Conservative cultural attitudes prevents some girls from attending school.

The number of literate women among the female population of India was between 2-6% from the British Raj onwards to the formation of the Republic of India in 1947. Concerted efforts led to improvement from 15.3% in 1961 to 28.5% in 1981. By 2001 literacy for women had exceeded 50% of the overall female population, though these statistics were still very low compared to world standards and even male literacy within India. Recently the Indian government has launched Saakshar Bharat Mission for Female Literacy. This mission aims to bring down female illiteracy by half of its present level.

Sita Anantha Raman outlines the progress of women’s education in India:

Since 1947 the Indian government has tried to provide incentives for girls’ school attendance through programmes for midday meals, free books, and uniforms. This welfare thrust raised primary enrollment between 1951 and 1981. In 1986 the National Policy on Education decided to restructure education in tune with the social framework of each
state, and with larger national goals. It emphasized that education was necessary for
democracy, and central to the improvement of women’s condition. The new policy aimed
at social change through revised texts, curricula, increased funding for schools, expansion
in the numbers of schools, and policy improvements. Emphasis was placed on expanding
girls’ occupational centres and primary education; secondary and higher education; and
rural and urban institutions. The report tried to connect problems like low school attendance
with poverty, and the dependence on girls for housework and sibling day care. The National
Literacy Mission also worked through female tutors in villages. Although the minimum
marriage age is now eighteen for girls, many continue to be married much earlier. Therefore,
at the secondary level, female dropout rates are high.

Sita Anantha Raman also maintains that while the educated Indian women workforce
maintains professionalism, the men outnumber them in most fields and, in some cases,
receive higher income for the same positions.

The education of women in India plays a significant role in improving livings standards in
the country. A higher women literacy rate improves the quality of life both at home and
outside of home, by encouraging and promoting education of children, especially female
children, and in reducing the infant mortality rate. Several studies have shown that a lower
level of women literacy rates results in higher levels of fertility and infant mortality, poorer
nutrition, lower earning potential and the lack of an ability to make decisions within a
household. Women’s lower educational levels is also shown to adversely affect the health
and living conditions of children. A survey that was conducted in India showed results
which support the fact that infant mortality rate was inversely related to female literacy rate
and educational level. The survey also suggests a correlation between education and
economic growth.

In India, it was found that there is a large disparity between female literacy rates in different
states. For example, while Kerala actually has a female literacy rate of about 86 percent,
Bihar and Uttar Pradesh have female literacy rates around 55-60 percent. These values
are further correlated with health levels of the Indians, where it was found that Kerala was
the state with the lowest infant mortality rate while Bihar and Uttar Pradesh are the states
with the lowest life expectancies in India. Furthermore, the disparity of female literacy
rates across rural and urban areas is also significant in India. Out of the 24 states in India,
6 of them have female literacy rates of below 60 percent. The rural state Rajasthan has a
female literacy rate of less than 12 percent.

In India, higher education is defined as the education of an age group between 18 and 24,
and is largely funded by the government. Despite women making up 24-50% of higher
education enrollment, there is still a gender imbalance within higher education. Only one
third of science students and 7% of engineering students, are women. In comparison
however, over half the students studying education are women.
INTRODUCING EDUCATION

Vocational education

The government of India is taking many positive steps to turn the education vocational and job oriented. Recently the duration of Graduation in Delhi University has been turned to 4 years from 3 years. Moreover government is taking lots of steps to promote small vocational institutes which provide job oriented courses like aviation related or travel & tourism related courses to name few examples.

One study found out that 25% of public sector teachers and 40% of public sector medical workers were absent during the survey. Among teachers who were paid to teach, absence rates ranged from 15% in Maharashtra to 30% in Bihar. Only 1 in nearly 3000 public school head teachers had ever dismissed a teacher for repeated absence. A study on teachers by Kremer etc. found that ‘only about half were teaching, during unannounced visits to a nationally representative sample of government primary schools in India.’.

A study of 188 government-run primary schools found that 59% of the schools had no drinking water and 89% had no toilets. 2003-04 data by National Institute of Educational Planning and Administration revealed that only 3.5% of primary schools in Bihar and Chhattisgarh had toilets for girls. In Madhya Pradesh, Maharashtra, Andhra Pradesh, Gujarat, Rajasthan and Himachal Pradesh, rates were 12-16%. In fact, the number of secondary schools is almost half the number of upper primary schools available in the country.

Curriculum issues

Modern education in India is often criticized for being based on rote learning rather than problem solving. New Indian Express says that Indian Education system seems to be producing zombies since in most of the schools students seemed to be spending majority of their time in preparing for competitive exams rather than learning or playing. Business Week criticizes the Indian curriculum, saying it revolves around rote learning, Express India suggests that students are focused on cramming. Preschool for Child Rights states that almost 99% of preschools do not have any curriculum at all.

Participation

At the lower secondary level (grades 9 and 10), enrolment rate is 52%, while at the senior secondary level (grades 11 and 12), it is 28%. While the enrollment rate in pre-school is merely 18%), there is a 48% drop-out rate in elementary education.

Controversy

In January 2010, the Government of India decided to withdraw Deemed university status from as many as 44 institutions. The Government claimed in its affidavit that academic considerations were not being kept in mind by the management of these institutions and that “they were being run as family fiefdoms”.
The University Grants Commission found 39 fake institutions operating in India.

Only 10% of manufacturers in India offer in-service training to their employees, compared with over 90% in China.

**Scheduled Castes and Schedule Tribes**

Following India’s independence a number of rules were formulated for the backward Scheduled Castes and the Scheduled Tribes of India, and in 1960 a list identifying 405 Scheduled Castes and 225 Scheduled Tribes was published by the central government. An amendment was made to the list in 1975, which identified 841 Scheduled Castes and 510 Scheduled Tribes. The total percentage of Scheduled Castes and Scheduled Tribes combined was found to be 22.5 percent with the Scheduled Castes accounting for 17 percent and the Scheduled Tribes accounting for the remaining 7.5 percent. Following the report many Scheduled Castes and Scheduled Tribes increasingly referred to themselves as Dalit, a Marathi language terminology used by B. R. Ambedkar which literally means “oppressed”.

The Scheduled Castes and Scheduled Tribes are provided for in many of India’s educational programmes. Special reservations are also provided for the Scheduled Castes and Scheduled Tribes in India, e.g. a reservation of 15% in Kendriya Vidyalaya for Scheduled Castes and another reservation of 7.5% in Kendriya Vidyalaya for Scheduled Tribes. Similar reservations are held by the Scheduled Castes and Scheduled Tribes in many schemes and educational facilities in India. The remote and far-flung regions of North East India are provided for under the Non Lapsible Central pool of Resources (NLCPR) since 1-99-1999. The NLCPR aims to provide funds for infrastructure development in these remote areas.

Women from remote, underdeveloped areas or from weaker social groups in Andhra Pradesh, Assam, Bihar, Jharkhand, Karnataka, Kerala, Gujarat, Uttar Pradesh, and Uttarakhand, fall under the Mahila Samakhya Scheme, initiated in 1989. Apart from provisions for education this programme also aims to raise awareness by holding meetings and seminars at rural levels. The government allowed 340 million (US$5.2 million) during 2007-08 to carry out this scheme over 83 districts including more than 21,000 villages.

Currently there are 68 Bal Bhavans and 10 Bal Kendra affiliated to the National Bal Bhavan. The scheme involves educational and social activities and recognising children with a marked talent for a particular educational stream. A number of programmes and activities are held under this scheme, which also involves cultural exchanges and participation in several international forums.
India’s minorities, especially the ones considered ‘educationally backward’ by the government, are provided for in the 1992 amendment of the Indian National Policy on Education (NPE). The government initiated the Scheme of Area Intensive Programme for Educationally Backward Minorities and Scheme of Financial Assistance or Modernisation of Madarsa Education as part of its revised Programme of Action (1992). Both these schemes were started nationwide by 1994. [94] In 2004 the Indian parliament passed an act which enabled minority education establishments to seek university affiliations if they passed the’ required norms. Surprisingly, in the field of Sindhi language, (an 8th schedule language, which is prevalently spoken by the Sindhis of India who have no state of their own) government has not made any significant contribution. Sindhis are linguistic minority and most of the states have no Sindhi schools or schools with Sindhi language as an optional paper. Sindhis with around ten million population have less than 100 teachers in this language. Sindhi, basically draws its origin from Indus Valley civilization. While the language has Indo-aryan origin, it is prevalently spoken in Pakistan and patronized by the Pakistan Government. Most of the Sindhi associations fear that due to apathy of Indian Government, Sindhi language and culture will only be a story for the future generations. Rajesh Thadani, President of Bihar Sindhi Association, which was constituted by the first Governor of Bihar, Jairamdas Doulatram, has started awareness campaign in this direction. This campaign has gathered momentum and it has started recognition worldwide.
Universities are the seats of higher learning from where the society gets its leaders in Science, Arts and various other fields of national life. University education in India aims at providing knowledge and wisdom which are necessary attributes of a well developed personality. University education is a centre for higher branches of learning. The functions of the university are varied. It provides instruction, conduct research and post-graduate studies, and gives affiliation and extension to the colleges under it. In case of a non-affiliating unitary university, there is no college under it and its function is limited to offering masters programme and conducting research. A university’s scope is national in character. The main purpose of establishing a university in a particular region is to make higher education accessible to all sections of the population within its territorial jurisdiction. The first Education Commission of 1948, known as Radhakrishnan Commission, forms the main thrust of this unit.

After independence, the first significant step taken by the Government of India in the field of education was the appointment of the University Education Commission in 1948 under the Chairmanship of Dr. Sarvapalli Radhakrishnan, a distinguished scholar and former vice-chancellor of Banaras Hindu University and who became the second President of India. The Commission was appointed by the Government of India to go into the problems and prospects of Indian University Education and to suggest improvements and extensions that might be considered desirable to suit the present and future requirements of the country. The Commission was appointed in November, 1948 and it submitted its report in August, 1949.

The Report of the Commission is a document of great importance as it has guided the development of university education in India since independence. The Inter-University Board of Education and Central Advisory Board of Education recommended to the Government of India that an All India Commission on Education should be appointed to inquire into the requirements of the higher education in India and to put forward the recommendations for the re-organization of the University Education system in the light of the requirements of the country and its traditions. Because of the fact that Dr. Radhakrishnan was the Chairman of the Commission it is known as ‘Radhakrishnan Commission’. There were 10 members in the commission.

Dr. Sarvapalli Radhakrishnan, was —

- A distinguished scholar.
- Former Vice - Chancellor of Banaras Hindu University.
INTRODUCING EDUCATION

- Second President of India.
- Spalding Professor of Eastern Religious and Ethics at the University of Oxford.
- Chairman, University Education Commission (1948-49).

The Appointment of the Commission-its aim and objective:

The Radhakrishnan Commission was appointed with the specific aim ‘to report on Indian University Education and suggest improvements and extensions that may be desirable to suit present and future requirements of the country’. The decision was due to the realization that a reconstruction of university education was essential for a national-cultural resurgence as well as for meeting the requirements of scientific, technical and other man-power which India needed for its socio-economic development in the wake of the independence in 1947.

1. Terms of Reference:

The terms of reference of the Commission were to consider and make recommendations in regard to:

- The aims and objectives of university education and research in India.
- The changes considered necessary and desirable in the constitution, control, functions and jurisdiction of the universities in India.
- The finances of the universities.
- The maintenance of the highest standards of teaching and examinations in the universities and colleges under their control.
- The courses of study in the universities.
- The standards of admission to the university courses of study.
- The medium of instruction in the universities.
- The provision for advanced study in Indian culture, history, literatures, languages, philosophy and fine arts.
- The need for more universities on a regional or other basis.
- The organisations of advanced research in all branches of knowledge in the universities and institutes of higher research.
- Religious instruction in the universities.
- The special problems of all the universities in India.
- The qualification, conditions of service, salaries, privileges and functions of teachers and the encouragement for original research by teachers.
- The discipline of students, hostels and the organisation of tutorial work and any other student related matters.
Method of study:

The commission made a thorough study of the problems of Higher Education in India. It toured the country extensively in order to acquaint itself with the problems.

It prepared a questionnaire which was sent over to about 600 persons who mattered in the field of education. It interviewed administrators, organisations of the students and educationists. Thus, it tried to gather information in regard to almost all the aspects of university education. Its report runs into two volumes. The first part of the report contains 18 chapters and about 747 pages. The second volume contains the statistics in regard to institutions and other educational problems and the evidence tendered by the witnesses examined by the commission.

The Commission has laid down certain aims of university education in the country keeping in view the past tradition, the present conditions and future prospects of the country. In this context the Commission took into consideration the personal interests of the students and also of the nation. While defining the aims the Commission had been also conscious of the international obligations. We are giving below the aims of university education as laid down by the Commission:

- The aim of university education should be to produce able citizens who can take up national responsibilities successfully in various fields. The university has to produce able administrators and suitable workers in various occupations and industries. The university has to provide leadership in the various walks of life in the best interest of the nation.

- The aim of a university should be to maintain a high standard in general, professional and vocational education by inspiring the students to search for a new knowledge and good effort that must be authentic in nature.

- It is the duty of a university to preserve and develop the culture and civilization of the land. It is on the basis of one’s culture that one may acquire self-confidence, self-respect and self-dependence. These virtues on the part of citizens will make the nation really very strong.

- The university should generate new ideas and discard those which are likely to prevent the growth of the nation. For progress, it is necessary to rise above superstitions. The university has to help the students to imbibe the good aspects of their culture and to accept new values for an all-round development.

- The university should provide opportunities to acquire all kinds of knowledge.

- The university has to educate the mind and soul of the student in order that he may grow in wisdom.
It is the responsibility of the university to create a consciousness in students for protecting the Directive Principles as to be laid down in the Constitution. The university has to make the foundation of democracy strong and it has to develop the spirit in students for ensuring equality, fraternity and social justice to all while maintaining the integrity of the nation.

The University has to make new discoveries and inventions and it has to develop new original ideas in order to make the society strong.

The university has to instil moral values in the students while making them well disciplined.

The university has to develop the spirit of universal brotherhood and internationalism in the students.

The universities have to provide leadership in politics, administration, education, industry and commerce.

The universities should be organized as centres of civilization to train intellectual pioneers of civilization. The aim of university education should be to produce intellectual adventures.

Universities should produce such wise persons who may disseminate learning to make democracy successful and who may make an incessant search for new knowledge and unceasing effort to fulfil the mission of life.

One of the main functions of universities is to bring about the spiritual development of students.

We are engaged in a quest for democracy through the realization of justice, freedom, equality and fraternity. Hence, it is necessary that our universities should be the emblems and protectors of these ideals.

Contents of education must accept the best of what the modern advancement has to offer without neglecting our cultural heritage from the past.

Education should discover the innate qualities of a person and develop them through training.

Universities should preserve the culture and civilization of the country. To be civilized, we should sympathise with the poor, respect women, love peace and independence, and hate tyranny and injustice. The university education should infuse these ideals into the youths.

After having a discussion on the background and appointment of the commission as well as its basic recommendations on the aims and objectives of higher education, now we are going to discuss in detail the specific recommendations on the various aspects of the university education system in India.
Faculty in Universities: The University Education Commission has emphasized that the teacher plays a vital role in the education system; therefore, an adequate faculty with required qualifications are necessary to discharge many types of duties in a university or in a college. The university Education Commission recommended that proper care should be taken in the selection procedure of a teacher for the appointment as a professor, reader, lecturer and an instructor as well as for his or her salaries. Each university should have some research fellows. Besides theses, definite rules regarding the Provident Fund, leave and hours of work should be followed by a university.

Teaching Standards: The most important duty of a university is to maintain the highest standard of its teaching and examinations. In order to improve the teaching standard, the following are some of the recommendations that were made by the University Education Commission in 1948-1949:

- The standard of admission to the university courses should correspond to that of the present intermediate examination, i.e. after the completion of 12 years of study at a school and an intermediate college;
- That in each province a large number of well-equipped and well staffed intermediate colleges (with classes IX to XII or XI to XII) be established;
- That in order to divert students to different vocations after 10 to 12 years of schooling, a large number of occupational institutes be opened;
- That refresher courses be organized by the universities for high school and intermediate college teachers;
- That to avoid overcrowding at universities and colleges the maximum number in the Arts and Science faculties of a teaching university be fixed at 3,000 and in an affiliated college at 1500;
- That the number of working days be substantially increased to ensure a minimum of 180 days’ in the year, exclusive of examination days, with three terms, each of about 11 weeks’ duration;
- That lectures be carefully planned and supplemented by tutorials, library works and written exercises;
- That there be no prescribed text-books for any courses of study;
- That attendance at lectures be compulsory for under graduate students as at present, and that private candidates of only certain categories be allowed to appear for public examination. An experiment should, however, be made with the evening college for the working people;
INTRODUCING EDUCATION

■ That tutorial instruction be developed in all institutions imparting university education in the following manner:
(a) students should report to tutors in groups not exceeding 6 in numbers;
(b) tutorials should be made available to all undergraduates both pass and honours;
(c) tutorials should stimulate the mental development of the students and they should not become mere coaching for examination;
(d) if tutorials are to succeed, the teaching staff should be improved in quality and quantity.

■ That university libraries should be greatly improved by;
(a) large annual grants;
(b) the introduction of open access system;
(c) longer hours of work;
(d) better organization; and
(e) well-trained staff which include reference assistants.

That the laboratories be improved in building, fittings, equipment, workshops and technicians.” (Report of Radha-Krishnan Commission of 1948-49)

● Course of study: According to the recommendations of Radhakrishnan Commission, the general as well as specific interest of the students should be taken care of when the courses will be designed for the courses of the university level. Master Degree should be given to honours students after one year’s study beyond the bachelor’s degree. Literature for general education courses should be developed which will give the students an acquaintance with and mastery of the contents and methods of thinking and working in each field.

● Research and Training: The regulations for Master of Arts and Master of Science should be uniform in all universities of India. The admission procedure as well as the process for enrolling in Ph.D. degree should be arranged on an all India basis. D.Litt. and D.Sc. Degrees should be awarded on published work of outstanding quality. A large number of Scholarship should be provided for the research work to the university by the Ministry of Education. Fundamental research should be the primary step for a university.

● Professional Education: The University Education Commission has made some recommendations regarding professional education and has divided it into the five aspects of education as Agriculture Education, Commercial Education, Engineering and Technology, Legal Education and Medical Education.
Regarding Agriculture education, the Commission emphasized that agriculture education should be recognized as an important national issue and the study of the subject of agriculture should be introduced in all stages of education i.e. primary, secondary and higher level. The existing agriculture colleges and institutions should be improved and research centres should be established.

On the aspect of the Commercial Education, the Commission recommended that commercial education should be made more practical and the graduates should be encouraged to specialize in a particular branch. On the subject of Education, the faculty of training colleges should be recruited for giving training to the people who have first-hand experiences of school teaching. In assessing students’ performance, more stress should be given to practice only.

Regarding Engineering and Technology, the Radhakrishan Commission recommended the inclusion of the general education and basic physical engineering science in the engineering courses. Besides these, the Commission also suggested that the number of engineering schools and colleges should be increased, the existing engineering colleges’ should be upgraded for post graduate training and research in selected subjects and they should be closely associated with the universities.

In the context of Legal Education, the commission suggested that the law colleges should be thoroughly re-organized. Students pursuing degree courses in law should not be permitted to carry on other degree courses simultaneously.

Regarding Medical Education, the commission recommended that the maximum number of admission should be 100 and that all the departments of the study which require hospital facilities should be located in a single campus. There should be 10 beds for each student. Post-graduate training should be offered in certain well staffed colleges.

**Religious Education:** The University Education Commission 1948 recommended religious education in the colleges that—

- “all educational institution start work with a few minutes for silent meditation.
- That in the first year of the degree course the lives of great religious leaders like Gautama the Buddha, Confucius Zaroaster, Socrates, Jesus, Sankara, Ramanuja, Madhava, Mohammad, Kabir, Naik, Gandhi be taught.
- That in the second year some selections of a universalistic character from the scriptures of the world be studied.
- That in the third year, the central problems of the philosophy of religion be considered.”

**Examination or Evaluation System:** The University Education Commission criticized the present system of examination and stress was given to introducing the objective type
questions in the examination. Following are the basic ideas and suggestions of the University Education Commission in 1948-49 in this regard.

- The commission suggested the techniques in devising and constructing objective test for the class examination in colleges and universities.
- The Government should not insist on university degrees for the administrative services.
- According to the University Education Commission, Credit should be given for the class work and one third of the mark allotted to each subject should be reserved for work done during the course of instruction.
- The standard of success at the various examinations should be uniform in all universities.
- The Commission divided the rank after passing the examination as getting 70% or more marks should be given the rank of first class, 55% to 69% for the rank of second class and at least 40% for the rank of third class.
- The system of grace marks should be abolished.
- Viva-voce examination should be employed only for professional and post graduate degrees.
- The essay type of questions should continue with the objective type questions but the type of question, method of examination should be thoroughly changed with a view to making it more valid and reliable.

Students’ Activities and Welfare: Regarding the students’ activities and their part in the wellbeing of the nation, the Commission suggested the following recommendations:

- The students should undergo thorough physical examination at the time of admission and at least once a year thereafter.
- All universities must have hospital and health service.
- Sanitary inspection of the campus buildings, hostels, dining rooms, kitchens and off-campus residences must be undertaken in a university.
- Competent staff should be provided for compulsory physical training and a regular time should be assigned for the purpose.
- Social service should be encouraged and it should remain on a completely voluntary basis.
- All students should receive N.C.C. training.
- Students union should be free-from political motives and activities.
* An office of the Dean of Students should be set up in colleges and universities.
* Women Education: Regarding the women education, the Commission suggested for providing the same facilities to the women colleges and universities as provided to men’s colleges and universities. The curriculum should also be prepared for them, considering them as both women and citizens.

**Administration and Finance of a University**: The university Education Commission considered the regulations and control capacity of a university in the followings ways:

* The university education should be placed on the concurrent list.
* Regarding the finance, co-ordination of facilities in special subjects, adoption of national policies, ensuring minimum standards of efficient administration and providing liaison between universities and national research laboratories and scientific surveys etc., the Central Government must have the responsibility towards the universities.
* For the allocation of grants to the universities a central Grants Commission should be established.
* There should be no university of the purely affiliating type.
* The governing bodies of the colleges should be properly constituted.
* The aim of an affiliated college should be to develop into a unitary university and later into a federative one.

**The organizational set-up of a university should be as follows**: 

(a) The Visitor,  
(b) The Chancellor,  
(c) The Vice-Chancellor,  
(d) The Senate (Court),  
(e) The Executive Council, (Syandicate)  
(f) The Academic Council,
INTRODUCING EDUCATION

(g) The Faculties,

↓

(h) The Boards of Studies,

↓

(i) The Finance Committee,

↓

(j) The Selection Committee

- Regarding finance, a University Grant Commission should be set up for allocating grants to the universities. The State should also take the responsibility for the financing of higher education.

Rural Universities and Colleges: Regarding Rural Universities and Colleges, the Commission said: “the general advancement of rural India will call for an ever increasing range and quality of skill and training. To supply these and to meet the requirement of an educated citizenship, a system of rural colleges and universities necessary”. (Report of Radha Krishnan Commission)

- A rural university should include a ring of small, resident under graduate colleges with specialized and university facilities in the centre.

- The number of students for the undergraduate resident colleges should be not more than three hundred, and the overall maximum enrolment for colleges and university combined should be about twenty-five hundred.

- Each college of about three hundred students should have separate teaching staff and facilities.

- In the rural colleges, the general studies should be combined with the practical course, so that the students become cultured and educated men and women equipped with skill-oriented.

- Regarding the curriculum of the rural university, the Commission said: “a common core of liberal education may be assumed for the rural university as for any other, though the methods used in teaching and learning may different. The Common core would include substantial introduction to the fields of Mathematics, Chemistry, Physics, Geology, Astronomy, Biology, Physical Education, Psychology, the Social Sciences, Philosophy and Languages and Literature.” So the Commission recommended the Common Core consisting of Mathematics, basic sciences, social sciences and language and literature.
After achieving independence in 1947, both the public and the Government began to take keen interest in the development of secondary education. Although the number of secondary schools and its enrolment began to significantly increase even before India’s attaining independence, the quality of education imparted was unable to meet the changing socio-economic needs of the country. As such, the need for reform was strongly felt. The university Education Commission also remarked that our secondary education remained the weakest link in our educational machinery and it needed urgent reforms. Meanwhile with the attainment of independence, the political situation of the country also underwent a complete transformation. Education also needed a fresh look, calling for a new outlook which was appropriately voiced by Maulana Abul Kalam Azad, the then Education Minister in his presidential address to the Central Advisory Board of Education in 1948. The Central Advisory Board of Education at its 14th meeting held in January 1948 recommended the appointment of a commission to examine the prevailing system of Secondary Education in the country and to suggest measures for its reorganization and improvement. There were other considerations also before the Government of India for setting up a commission for Secondary Education. In view of these considerations, the Government of India set up the Secondary Education Commission by Resolution dated 23rd September, 1952, under the Chairmanship of Dr. A. Lakshmanaswami Mudaliar, the Vice-Chancellor of the Madras University. Therefore this commission is also known as Mudaliar Commission. The Commission was inaugurated on 6th October, 1952. It submitted its Report on June 1953.

The terms of reference of this Commission are as follows:

a) To enquire into and report on the present position of Secondary Education in India in all its aspects.

b) To suggest measures for its re-organisation and improvement with particular reference to—

i) The aims, organisation and content of secondary education.

ii) Its relationship to primary, basic and higher education.

iii) The inter-relation of secondary schools of different types.

iv) Other allied problems. So that a sound and reasonable uniform system of secondary education suited to our needs and resources may be provided for the whole country.

The Commission prepared a questionnaire dealing with the various aspects of secondary education. This was sent out to various educational experts, teachers and educational
INTRODUCING EDUCATION

institutions of India. On the basis of the replies received a good deal of information was collected. The members of the Commission took an extensive tour of the various parts of India and acquired first-hand knowledge of the various educational problems and presented its report running on August 29, 1953.

The Commission pointed out the following defects of the existing system—

First, the education given in our schools is isolated from life. The curriculum as formulated and as presented through the traditional methods of teachings does not give the students insight into the everyday world in which they are living.

Secondly, it is narrow and one sided and it fails to train the whole personality of the student.

Thirdly, too much importance has been given to English. Students who did not possess special linguistic ability are, therefore, greatly handicapped in their studies.

Fourthly, the method of teaching generally practised failed to develop in the students their independence of thought and initiative in action.

Fifthly, the increase in size of the classes has considerably reduced personal contact between the teachers and the pupils. Thus the training of character and inculcation of proper discipline have been seriously undermined.

Finally, the dead weight of the examination has tended to curb the teachers initiative, to stereotype the curriculum, to promote mechanical and lifeless methods of teaching, to discourage all spirit of experimentation and to place the stress on the wrong, or unimportant things on education.

The Commission has made the following recommendations in regard to its aims of Secondary Education—

Development of democratic citizenship:

Since India has decided to make itself a democratic republic, the citizens have to be trained to uphold and practice the values of the democratic social order. This can be possible only when the qualities of discipline, tolerance, patriotism, co-operation, equal opportunities for thought, speech and writing, the essence of the world citizenship are inculcated and developed in the students. Secondary education, according to the Mudaliar Commission, should develop all these qualities in the students. Citizens with these qualities can grow into ideal citizens capable of making Indian democracy a success. In short, the aim of secondary education should be to develop ideal democratic citizens in the country.

Improvement of Vocational efficiency:

One of the urgent needs of the country is to increase the productive efficiency of its people and to increase the national income. For this, education must aim at increasing the productivity
or vocational efficiency of the young students. To achieve this goal, the Secondary Education Commission recommended for fostering the dignity of manual labour and for the promotion of technical skills for the advancement of industry and technology through secondary education. Therefore, secondary education is to be freed from purely theoretical education system and emphasis is to be placed on agricultural, technical, commercial and other practical courses.

**Education for leadership:**

Secondary education is a terminal point for majority of the students. Therefore, at the end of the school education, each pupil must be able to enter into various professions independently. “A special function of the secondary school, in the context, is to train persons who will be able to assume the responsibility of leadership - in social, political, industrial or cultural fields - in their own small groups of community or locality.”

**Development of personality:**

The secondary education must aim at the development of the personality of the students. It should be so organised that the creative energy in the students should find proper expression. They should also be trained to appreciate their cultural heritage and acquire constructive and valuable interest. They should also be trained to preserve and conserve their cultural heritage. An all-round development of the personality of the student is an essential aim of secondary education.

Regarding the organizational pattern of secondary education, the Secondary Education Commission recommended that secondary education should be a complete stage by itself. This stage of education is most important for the students in their preparation for life. To raise the standard of school education the Commission proposed the following organizational pattern:

The duration of secondary education should be 7 years. It should cover the age of group of 11-17.

Under the new organizational structure secondary education should commence after 4 or 5 years of primary or junior basic education.

The middle or senior basic or lower secondary stage should cover a period of 3 years.

The higher secondary stage should cover 3 years.

The commission also suggested abolition of the present intermediate classes. The 12th class should be attached to the university and the 11th class should be added to the high school. Thus it pleaded for one year pre-university and 3 year degree courses.

The commission recommended that technical schools should be started in large number and central technical institutes should be established in large cities.
Multi-purpose schools should be established, which would provide terminal courses in technology, commerce, agriculture, fine arts and home sciences. The object of these institutions was to direct students into different walks of life at the end of the secondary course and this will reduce the pressure upon university entrance.

The Secondary Education Commission has discussed at length the secondary education curriculum. First it pointed out the defects of the existing curriculum, discussed in detail the principle of curriculum construction and finally the curriculum of different stages of secondary schools.

The Commission has pointed out the following defects in the existing curriculum:

- The present curriculum is narrow.
- It is bookish and theoretical.
- It is overcrowded and does not provide rich and significant contents.
- There is no adequate provision for practical and other kinds of activities that should find place in any curriculum at this stage of education. Hence, the curriculum is not able to bring about the education of the whole personality of the child.
- It does not cater to the various needs and capacities of the adolescents.
- Technical and vocational subjects are very much needed for India today, but the curriculum does not find room for these subjects.
- Curriculum is too much dominated by the examination.

The Secondary Education Commission has recommended some principles to be followed in the construction of curriculum.

**Principles of totality of experience:** According to the Secondary Education Commission, “The curriculum does not include only the academic subjects traditionally taught in the school but it includes the totality of experiences that a pupil receives through manifold activities that go in the school, in the classroom, library, laboratory, workshop, playground and in numerous informal contacts between teachers and pupils.” All types of experiences in the school or planned by the school should be included in the curriculum.

**Principles of variety and elasticity:** The Curriculum should be elastic and include varieties of subjects and activities to meet the needs of the various types of pupils. The curriculum should be adaptable to meet the needs and interests of the students.

**Principles relating to community:** The curriculum should be related to the community. There should be community-oriented programmes in the curriculum so that a child can feel that he is an integral part of the local community. The curriculum should bring the child and the community closer.
**Principle of training for leisure:** The Curriculum should be designed to train the students not only for work but also for leisure. For this purpose there should be a number of activities - social, aesthetic, sporting etc. which should be included in the curriculum. These activities will train the students to use their leisure time properly.

**Principles of integration and correlation:** The curriculum should not be merely a bundle of subjects and activities. The activities and subjects should be integrated and well correlated.

The curriculum should provide a ‘broad field’ units having direct bearing on life.

1) Curriculum for Middle Schools
2) Curriculum for High and Higher Secondary Schools.

The Commission has laid down the following different curriculum for these two stages in the secondary education.

1) **Curriculum for the Middle Schools:** The Commission has recommended the inclusion of the following subjects.

   a) English.
   b) Social Studies.
   c) General Science.
   d) Mathematics.
   e) Art and Music.
   f) Craft.
   g) Physical Education.

2) **The Curriculum for High and Higher Secondary Schools:** For this stage of education, the commission has suggested that there should be a diversified course.

   (a) Compulsory subjects or main subjects; and (b) Optional subjects.

A) **Compulsory Subjects:**

The Compulsory subjects shall include the following:

1. Mother tongue or regional language or composite course of the mother tongue and a classical language.
2. One other language to be chosen from among the following:
   i) Hindi for those whose mother tongue is not Hindi.
   ii) Elementary English (for those who have not studied English in the middle stage).
   iii) Advanced English (for those who have studied English at the earlier stage).
iv) A Modern Indian Language (other than Hindi).
v) A modern foreign language (other than English).
vi) A classical language.

3. Social Studies - General course (for the first two years only).

4. General Science, Including Mathematics - General course (for the first two years only).

5. One Craft to be chosen out of the list given below:
   i) Spinning and weaving
   ii) Wood Work
   iii) Metal Work
   iv) Gardening
   v) Tailoring
   vi) Typography
   vii) Workshop Practice
   viii) Sewing, Needle Work and Embroidery
   ix) Modelling

B) Optional Subjects:

Three subjects from one of the following groups -

Group - 1 (Humanities):

(a) A classical language or a third language from A (2) not already taken; (b) History; (c) Geography; (d) Elements of Economics and Civics; (e) Elements of Psychology and Logic; (f) Mathematics; (g) Music; (h) Domestic Science.

Group - 2 (Sciences):

(a) Physics; (b) Chemistry; (c) Biology; (d) Geography; (e) Mathematics; (f) Elements of Physiology and Hygiene; (not to be taken with Biology).

Group - 3 (Technical):

(a) Applied Mathematics and Geometrical Engineering; (b) Applied Science; (c) Elements of Mechanical Engineering; (d) Elements of Electrical Engineering.

Group - 4 (Commercial):

(a) Commercial Practice; (b) Book-Keeping; (c) Commercial Geography or Elements of Economics and Civics; (d) Shorthand and Typewriting.
Group - 5 (Agriculture):

(a) General Agriculture; (b) Animal Husbandry; (c) Horticulture and Gardening;
(d) Agricultural Chemistry and Botany.

Group - 6 (Fine Arts):

(a) History of Art; (b) Drawing and Designing; (c) Painting; (d) Modelling; (e) Music;
(f) Dancing.

Group - 7 (Home Science):

(a) Home Economics; (b) Nutrition and Cookery; (c) Mother Craft and Child Care;
(d) Household Management and Home Nursing.

Besides the above, a student may take as his option one additional subject from any of the above groups irrespective of whether or not he has chosen his other options from that particular group.
Kothari Education Commission, 1964-66, was the sixth commission in the history of commission in India. The Five Years Plan, started after independence helped the growth of the country in many areas. However, the execution of these plans expresses the inherent weakness due to which the expected success was not being achieved. Education appeared to be one of areas which indicated many problems that needed our efforts for immediate solutions. The government was fully aware of the situation. To improve the educational set up the government constituted two commissions after independence. We have already discussed about the two commissions, i.e. Radhakrishnan Commission which deals with university education and Secondary Education Commission, confined to secondary education only. The recommendations of these two commissions could not be succeeded in its full implementations. Consequently, the defects in the area of education persisted. In order to remove these defects, the government had to appoint a new education commission to advise the government on national pattern of education along with general principles and policies for the development of education at all stages.

The Commission was appointed under provision of a resolution of the Government of India, dated 14th July 1964. The Commission included eminent educationists in diverse fields from India and abroad. It consisted of total 17 members, where 14 members, 1 member - secretary, 1 Associate - Secretary and Dr. D.S. Kothari, chairman of the U.G.C. was appointed as the chairman of the commission. Therefore, it is also known as the Kothari Commission. Among the members of the commission 5 educationists were from England, America, France, Japan and Russia. J.P. Naik was appointed as number secretary of the commission and J.F McDougall as associated secretary.

Prof. D.S. Kothari, Chairman, University Grants Commission, New Delhi was appointed as the Chairman of the Commission. The commission consisted of 17 members.

The unique features of the Education Commission (1964-66) were:

i) All the five earlier commissions did not deal with education as a whole but focussed attention on different levels of education. But this commission was not to limit its enquiry to specific sectors or aspects of education, but to have a comprehensive review of the Entire Educational System.

ii) Another unique feature of the Commission was its conviction that education is the most powerful instrument of the national development. The crucial role of education in national development appears in all its vividness on every page of the report.
Never before education was given such a niche of national honour, and never before was it conceived as a pivot of national honour, and never before was it conceived as a pivot of nation’s progress and the prosperity as revealed in the pages of the Commission’s Report.

iii) The international composition of the commission is also significant. Education in India must necessarily emerge from Indian experience, through, culture and local conditions. But as education remains the common quest of mankind, it was found profitable to draw upon the experience and thinking of educationists and scientists from other countries and to take advantage of the latest developments in the educationally advanced countries. As such the commission included 7 Indian members and 5 others; 1 each from Japan, France, U.K., U.S.A. and USSR, besides, 20 consultants from different countries of the world were available.

The commission started its work on the birthday of Mahatma Gandhi, the father of the nation. It constituted 12 task forces and 7 working groups for studying the various problems of education in the country. It interviewed about 9000 men and women distinguished in public life, educators, scientists, industrialists and scholars in different fields and others interested in education. The Commission spent about hundred days in visiting universities, colleges and schools and held discussions with teachers, educationists, administrators and students. It received and scrutinized 2,400 Memorandum and notes. The commission worked for 21 months and submitted its report on June, 1966.

The report of the commission is an excellent document on education. In its report the commission expressed its from belief that education is the most powerful instrument of national development. The report of the commission has been appropriately entitled as ‘education and national development.’

The report is divided into four sections:

Section I : deal with general Problems
Section II : deal with Education at different stages and in different sectors.
Section III : deals with implementation of the various recommendations and programmes suggested by the commission
Section IV : consists of supplementary papers

The programmes of educational reconstructions proposed in this Report fall into three broad categories —

1) Internal transformation of the educational system so as to relate it to the life, needs and aspirations of the nation
2) Qualitative improvement of education so that the standards achieved are adequate, keeping continually rising and, at least in a few sectors become internationally comparable; and,

3) Expansion of educational facilities broadly on the basis of man-power needs and with an accent on equalization of educational opportunities.

Education has a very extensive role to play in changing the men and society. It has to be entirely reformed and related to the life, needs and aspirations of the people so that it may serve as a powerful tool of social, economic and cultural transformation. In order to relate education, the commission recommended the following objectives—

1. Increase in Productivity.
2. Promoting social and National Integration
3. Education and Modernization
4. Developing social, moral and spiritual values.

1. **Increase in Productivity**—

The Commission suggested that education must be related to productivity to increase national income. In order to link education and productivity the Indian Education Commission made the following recommendations.

i) Science is the basic component of education and culture; so it should be made an integral part of school education.

ii) To inculcate the value of manual work the commission recommended the introduction of work experience in school education.

iii) To meet the increasing needs of technical personnel in Industry, agriculture and trade the IEC recommended to introduce vocational subjects in school curriculum. It also opined that the vocationalisation will bring education into closer relationship with productivity.

2. **Promoting social and National Integration**—

National and social integration is the precondition for the progress and development of a country. According to the commission, Social and National Integration is an important objective of a national system of education. The commission made the following recommendations for strengthening social and national integration through education.

i) To make education a powerful instrument of national development, common school system of public education should be adopted.

ii) Bridge the gulf between the educated and the uneducated, intellectuals and masses, social and national service should be made an integral part of school education,
3. Education and Modernisation—

The present society is a science-based society. The present century has made tremendous advancement in scientific and technical knowledge as a result of explosion of knowledge. In such a situation one of the main functions of education is to keep pace with this advancement of knowledge. Another feature of modern society is the rapid social change. In the situation of change, the school must always be alert if it is to keep abreast of significant changes. An education system which does not renovate itself continuously, becomes outdated and puts hindrance to progress. To keep pace with modernisation the IEC is of the opinion that “greater emphasis must be placed on vocational subjects, science education and research.”

4. Social, moral and spiritual values—

The national system of education should emphasis on the cultivation of social, moral and spiritual values among students. For this purpose the commission made the following recommendations:

i) The Central and State governments should adopt measures to introduce education in moral, social and spiritual values in all institutions under their direct control on the lines recommended by the University Education Commission on religious and moral instruction.

ii) In order to develop social, moral and religious values, some periods should be provided in the time table. Instruction of this type should be given by general teachers,

iii) The University departments should be specially concerned with the ways in which these values can be taught wisely and effectively and should undertake preparation of the special literature for use by students and teacher.

The Commission recommended a new structural pattern of education. The new educational structure should be as follows:

- One to three years of pre-school education.
- A primary stage of 7 to 8 years divided into a lower primary stage of 4 or 5 years and a higher primary stage of 3 or 2 years.
- A lower secondary stage of 3 or 2 years of general education or 1 to 3 years of vocational education.
The Indian Education Commission

- A higher secondary stage of 2 years of general education or 1 to 3 years of vocational education, 50% of the total would be under vocational education,

- A higher education stage of 3 years or more for the first degree course followed by courses of varying durations for the second or research degrees.

- The structural pattern thus recommended by the commission is commonly known as 10+2+3.

- Pre-school education from 1 to 3 years should also be given.

- General education should last for a period of 10 years -
  - 4 years of lower primary,
  - 3 years of higher primary
  - 3 years of lower secondary education.

- Higher secondary education should be fixed for 2 years.

- Degree course should be of 3 years.

- The age of admission to class I should not be less than 6+. The first public external examination should come at the end of the first 10 years of schooling. Secondary schools should be of two types: higher schools providing a 10 years’ course and higher secondary schools providing a course of 11 or 12 years. A new higher secondary course consisting of classes XI and XII should be introduced. The pre-university courses should be transferred from Universities and added to the secondary schools. The Commission has suggested the reorganisation of the university stage. At this stage, the three year degree has been favoured by the Commission.

Kothari Commission on Primary Education

The Commission admitted the need for quantitative expansion and qualitative improvement. It suggested that (i) primary education should start at 6+ and continue thereafter for 11 years, (ii) This total period may be subdivided into 4/5 years of Lower Primary education must immediately be made ‘free’, while a time bound programme may be adopted for Upper Primary education, (iii) Primary education should be followed by 1-3 years of vocational education or 3 year Lower Secondary education.

The aim of primary education would be to lay a good foundation of life as a responsible citizen. Pre-registration system should be introduced and all children of the relevant age-
group must be forced to attend school. Simultaneously, effort must be made to plug wastage and stagnation. It must be guaranteed that no child leaves school without completing lower primary education and at least 80% complete the 7 years school course.

The curriculum must be freed from pedantic matters. Emphasis at the lower-primary stage should be placed upon Language, Elementary Mathematics, and Nature Study. The syllabuses for classes I to IV would consist of 3 Rs. Lessons on phenomenal and social environment and health etc. The mother tongue should be the medium of instruction, and not more than one language should be insisted upon. In case the mother tongue should be accepted as medium, it there are 10 children per class or 40 children in a school speaking a language other than the accepted language, these children should be provided with their own language as medium. They may, however, learn the regional language optionally.

The pace of mental growth of all children at the primary school age being unequal, the Commission disfavoured the pre-fixation of a common standard for all. Moreover, classes I & II should together form a cycle at the end of which an evaluation of attainment may be made. Classes III & IV may form another such cycle. All examinations should be internal and evaluation done in grading system.

The Commission proposed social service with the object of imparting social consciousness. Living a co-operative community life in school, looking after cleanliness and decoration of the class room, white-washing and painting of school building, acquaintance with rural society, participation in community development work, helping the old, inform and crippled may be listed as social service items.

Emphasis was similarly placed upon ‘Work Experience’ through paper and clay work, spinning, gardening etc. In this context the Commission expressed a sound opinion about Basic Education. Basic Education has 3 characteristics- (a) productive work, (b) integration of creativity and environment life with curricular studies, (c) close relation between school and society. These characteristics should permeate the whole field of education through ‘work experience’. No particular type of education or school, therefore, need be characterized as Basic school.

Upper Primary Stage: Teaching and learning process at this stage will be more intensive and extensive. The methods and standards will be more clearly defined. The curriculum would include (1) Mother Tongue (or Regional language), (2) One more language - Hindi or English (a third language may be offered electively), (3) a combined study of Arithmetic and Algebra (4) History, (5) Geography (6) Civics (7) (a) Physics, Zoology and Earth Science in class VI, (b) Physics, Chemistry, Zoology and Astronomy in class VII. These sciences would be presented a distinctive disciplines Moral education and some productive art or craft should be added to the list.

142
For social services at this stage, the list of activities would include school development work, public health and community development work, public health and community development work. Work-experience would include cane and bamboo craft, leather work, pottery, weaving, gardening or farm work. Examinations should be internal on cumulative basis. Oral testing should be added to written examination. District-wise competitive examinations may be held with the object of evaluating the standard of education. Even on that case, certificates and cumulative cards would be issued by the school authorities. Such examinations may also be held on a voluntary basis to select candidates for scholarships.

The commission opined that like the ‘A’ course in England, a superior syllabus may be provided for the meritorious children. For those who would not proceed to formal secondary education, provisions should be made for alternative part-time vocational courses. Admission to such courses should, at the initial stage, be voluntary. But the target should be fixed at vocational courses for 20% by 1985-86.

The problem of providing the necessary numbers of Upper Primary Schools would be much more acute than the same at lower primary stage. Many new schools would be required. The commission, therefore, phased the admission programme.

The commission enunciated objectives of Secondary Education, suggested a reformed structural pattern and curricular reorganization.

The aims of secondary education would be to provide a solid basis of general education for democratic citizenship, on the basis of which education the individual would be able to proceed to (i) higher education, (i) education for specialization, (iii) various forms of technical and vocational education and, (iv) employment for living.

The integrated total period of secondary education might be advantageously divided into two inter-related sub-stages- (a) Lower Secondary stage (class VIII/IX to X), and (b) Higher secondary stage (classes XI and XII).

Lower Secondary Education: Subjects studied at the Upper Primary stage would be more intensively studied at the stage. The Curriculum, would consist of (1) Three languages. (Mother tongue/ Regional language, State/associated State language, any modern Indian language), (2) Physics, (3) Chemistry, (4) Zoology, (5) Botany, (6) History, (7) Geography, (8) Civics (9) Physical and moral education and (10) any Fine Art.

In the matter of social service, special emphasis would be placed upon Community Development work. Compulsory social work for ten days per year or consolidated 30 days for the 3 years of lower secondary stage would be insisted upon. Wood work, Metal
INTRODUCING EDUCATION

work, Leather work, Carpet making, Book Binding, Tailoring, Printing work etc, should feature in Work Experience programme. To make work-experience production oriented, efforts should be made to forge a direct link with farm to factory work.

There would be no specialization or diversification of studies at this stage. Upto class X, the courses will be common and general. At the end of this stage, an external examination will be the terminal point.

Admission targets were fixed at—

<table>
<thead>
<tr>
<th></th>
<th>1970-71</th>
<th>1975-76</th>
<th>1985-86</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>23.4%</td>
<td>29.1%</td>
<td>46% of the concerned</td>
</tr>
</tbody>
</table>

Age group. The objective would be a gradual diversion of 20% of children to vocational courses of 1 to 3 year duration. This would necessitate the establishment of part/full time institutions to receive children at the end of 7th/8th grade. These Industrial Training Institutes and Technical Schools would prepare the students for practical jobs. Diversion would be phased as -

<table>
<thead>
<tr>
<th></th>
<th>1970-71</th>
<th>1975-76</th>
<th>1985-86</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.8%</td>
<td>6.4%</td>
<td>20%</td>
</tr>
</tbody>
</table>

Higher Secondary Education: The objective at this stage would be to enlarge and strengthen the foundation of general education together with an orientation to specialization. But complete specialization being considered inadvisable, the stream system of Mudaliar Scheme would be abolished. Subjects offered under the Technical, Agricultural, Fine Arts, Domestic Sciences and Commerce streams should properly be placed in polytechnics or industrial and agricultural institutions. Hence, Higher Secondary Education would also be General Education in the Sciences and Humanities.

The Curriculum would consist of (a) 2 languages (as discussed earlier), and (b) 3 elective subjects. The election would not be limited to either arts or science, Free selection would be permitted. Principle of election being recognized, the study of sciences would not be compulsory, but liberal arrangements should be made for the study of science subjects in conformity with rural or urban environments. Agricultural Science would be accorded proper recognition as a Science. Although no special syllabus would be provided for girls, Domestic Science, Music, Fine Arts may be enlisted as elective subjects. Half of the reading time would be devoted to the elective subjects, to the languages and to physical education and other co-curricular work. Work Experience would be provided in fields and factories. Life in labour-camp would meet the demand for social service. Ten days a year or consolidated 20 days in two years in a labour-camp and six hours work a day would meet the requirement. Organisation of the curriculum at Ordinary and Advanced
levels might be a special feature. Proficiency certificates on the basis of the terminal external examination would be issued by the Board. The certificate would record only the marks obtained in each subject without mentioning any aggregate pass or fail. Students might take Compartmental Examinations. School-evaluation and certificate would accompany the external certificated.

*The targets* for schooling provision in terms of percentage of the concerned age group were –

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>7%</td>
<td>9.2%</td>
<td>11%</td>
<td>14.8%</td>
<td>20.4%</td>
</tr>
</tbody>
</table>

All students would not pursue the general course. Alternative vocational courses would draft students in the following phases:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>40.6%</td>
<td>42.1%</td>
<td>45.9%</td>
<td>47.9%</td>
<td>50%</td>
</tr>
</tbody>
</table>

This vocational education, either part time of full time, would be provided in factories, Polytechniques, I.TIs, Sandwich Course and Agricultural Polytechs. 3 year Certificate or Diploma courses would be initiated in Commerce, Cottage Industries, Public Health, Public Administration etc.

The commission recommended a rapid expansion of secondary education so that all children of lower secondary age group might be provided with attendance facilities by 1985. Such expansion would require 75000 additional teaching posts per year. Hence, Teacher Training should have a considerable priority in educational budgets.

**Kothari Commission on Higher Education**

In the context of such a deep crisis came the recommendations of Kothari Commission. The aim of higher education would be search for knowledge and truth, as well as dissemination of that knowledge. The university must supply the necessary leadership and help equitability in social life, reduce gaps in culture by producing a well organized generation of young talent. The university has responsibility to improve the entire pattern of education, even by devising scientific methods of instruction. Education of the adult population must be one of its charges.

Higher education requires quantitative expansion and qualitative improvement simultaneously. Hence the commission placed special emphasis upon equipment, management, teachers’ qualifications, reform of examinations at the undergraduate stage. At the same time it recommended reform of university administration and improvement of teaching and research at the post graduate stage. New universities may be founded only in the interest of qualitative
improvement, specialization of studies and to help the productive possibilities of specific regions. In any case, new universities should be established with prior consent of the U.G.C.

In regard to qualitative improvement, the Commission suggested the establishment of some “advanced centres of study” and the upgrading of 4 universities to the status of Major Universities to provide for education at international standards. The commission’s recommendation in respect of language formula, students’ welfare etc have already been discussed. In regards to the tricky question of admission to higher studies, the commission recommended a principle of admission determined by financial provisions, man power needs, intake capacity of institutions and standard of higher education. On the whole the commission proposed a Selective Approach. Many of the recommendations, however, still remain paper documents.

GENERAL, VOCATIONAL AND TECHNICAL EDUCATION

The most general and common meaning of education is schooling. People regard this concept of education to be synonymous with intellectual knowledge or formal instruction. But education does not mean merely the acquisition of intellectual knowledge but also bring the pupil up or develop in him those habits and attitudes with which he may successfully face the future.

General Education

General education is the process by which all the individuals in a society acquire a common medium of mutual communication resulting in the development of common attitude and acquisition of traits of democratic citizenship.

According to Dr. Dewey general education seeks to discover an intermediary between aimless education and the education of inculcation and indoctrination. In the words of W. H., Stickler- General education seeks to extend all men the benefits of an education that liberates.

The concept of general education means that type of education which is concerned with the training of intelligence, contemplative knowledge and refinement of tastes. It caters to the cultural, aesthetic and academic aspect of our life. It stands for training for beautiful and refined life or culture. The Greeks first formulated that conception of education which we yet call general or liberal education. The Greek conception of manhood, of fully developed personality was broad indeed. To the Greeks we owe the first attempt to secure the development of personality on the thought side. The love of knowledge for knowledge’s sake found with them its first disciples, inquiry into nature, into man into the supernatural, was fearlessly attempted by the Greeks. They first formulated the conception
of man as primarily a rational being. Through the realization of his own nature each must work out the things that life is to be lived for. Science, art, philosophy, religion etc., are means to this end. The work of the Greeks was also to determine the things in this life worth living for. Aristotle says that the aim of life is living happily and beautifully. They (Greeks) believe that general or liberal education is a means to achieve this end.

In course of time people began to think of general education as nothing but acquisition of knowledge for the development of intellectual life. All manual work was regarded as vulgar. Only a life of contemplation and culture is to be aimed at through the process of general education. Hence general education should get precedence over special or vocational education. Consequently in our days also we find division between a general education having to do with the self-sufficing life of leisure devoted to knowing for its own sake and a useful practical training or vocational education devoid of intellectual and aesthetic content.

**Concept of vocational education**

Vocational education means that type of education which prepares students for employment in a particular vocation. It stands for job-training or training for specific profession. Vocational education is that process of education by which individual’s competence in a professional area is increased through specialized training. It also fulfils particular need of each individual. Specialisation involves the progressive narrowing down of the area of study. There is nothing to be worried about in this natural feature of specialization. It is by narrowing down the limits of inquiry that new knowledge is obtained.

**Its Importance**

Every man needs some food to nourish and sustain his body, a shelter to protect himself from the sun and the rains, clothes and some luxuries to maintain the customary standard of living. No man can meet all these needs without depending on any employment. To solve these problems man requires some occupation to choose and engage himself. The life of the earliest man was simple. His mode of work was also simple. But with the advancement of man’s civilization came the question of skill and learning in the method of earning his bread. This is an age of hard competition. Specialization becomes the criterion of the man’s professional success in such a condition. A choice is to be made and necessary steps undertaken with a view to obtaining proper and dignified employment. Naturally the vocational aims of education aim at preparing the pupil for a living. Vocational education is a comprehensive term embracing those aspects if the educational process involving in addition to general education the study if technologies and related science and the acquisition of practical skills, attitudes, understanding and knowledge related to occupations in various sectors of economic and social life.
Criticism

Occupation according to ability must be the basis of vocational education. The aim of vocational education is to prepare the pupil for the present complex society. As a result of this, vocational education has become partial. The liberal education is being neglected. The aim of education is more or less industrial in outlook and consequently, technical education is more in demand than liberal education. Even general education is taken as vocational education. This has created a general that literature, philosophy and history have no cultural value and that these subjects are studied according to the demands of the society. Undue emphasis given to the vocational aims of education created a false belief that special training cannot be meant for all. It is the proud possession and privilege of the few to acquire such training.

Competition and self-interest form the basis of our present day society. This has led to the stifling of individuality. The demands of the society determine the social standard, and values of profession. Consequently, education takes no notice of aptitude, needs problems and interests of the pupils. They are rather compelled to take up profession according to the demands of the society.

It may be noted that the aim of education is not merely to lead the pupil in the acquirement of special training but also to bring him up or develop in him those habits and attitudes with which he may successfully face the future. In conclusion, it may be said that vocational education aims should also give stress on liberal education.

General and Vocational Education are not opposed to each other.

At present it is useless to debate on the question ‘General vs. Vocational education’ in the form in which it first arose. The two contending concepts have undergone considerable modification with the passing of year. Generally speaking. It is now conceded on all hand that education for life requires both technical or specific education and training which has no direct vocational bearing. Yet there remains the rivalry between the two-General vs. Vocational education and this is found in the conflict between the uniform versus the differentiated curriculum, duty versus interests, discipline versus information, culture versus utility, and all the rest. Concepts of general and special education are not contradictory, but are complementary to each other. It is wrong to isolate General or liberal and special or vocational. “The anti-thesis between a technical education and liberal education is fallacious. There can be adequate technical education which is not liberal, and no liberal education which is not technical, that is, no education which impart both technique and intellectual vision.”

Vocational education is necessary for supplying the primary physical needs of life. Therefore we should not look down upon this type of education which gives training for some occupation, Similarly, the thought of earning a livelihood is an important matter for us all,
yet it is only a part. Man does not live by bread alone. He wants to live as a true human being. The question how a man spends his leisure is as important as the question how he does his work. His ways of utilizing his leisure time go for to determine his efficiency as a worker. A general education that is useless and a vocational education that is uncultured cannot be accepted. In modern days education that is uncultured cannot be accepted in a modern democratic society. True education should always enable the individual to live his life properly and perfectly. Education has mainly two aspects, the cultural aspect which makes a person grow and the productive aspects which makes a person do things. Both are essential. In the words of the Kothari Commission - “We visualize the future trend if school education to be towards a fruitful meaning of general and vocational education - general education containing of general and vocational - general education containing some elements of pre-vocational and technical education and vocational education in turn having an element of general education.”

**Vocational education**

Vocational implies occupation of man. Vocational educational refers to occupational education as such. The vocational aim of educational remains in the field of education but it has been ignored so long. In ancient Athens, Occupation, had no place in the curriculum for the elite. The reason for its exclusion was that it would narrow the outlook of man. As the Athenians were averse to manual labour, education held no vocational aim to them.

**Conception of Vocational education according to different schools of philosophy**

Aims of education influenced by idealism overlooked the vocational side of education. Idealism is interested in man and not in things. Education is nothing but self-realisation to the idealist. The idealist holds that the aim of education is to arouse the self in man and to help to know the supreme good. The idealist cannot bear that the aim of education is to acquire ability for occupation. Realism and Pragmatism, however, accept the acquisition of ability for earning livelihood as one of the aims of education. According to the Realist, education meets the future needs of man. Consequently, provision for occupation through acquisition of ability is the aim of education.

**Utility of vocational education**

The vocational aims of education are unavoidable for man and society. It is recognized by all that education must cater to the needs of students. So that they can arm themselves in the struggle for existence. Vocational education was not neglected in ancient India.

**Meaning of vocation**

Vocational aim of education is important. Occupation is used in a wide sense. It covers every activity of man including his occupation, profession and calling. The modern view if giving education to the pupil according to his according to his ability gives prominence to
the vocational side of education. Equality is one of the cardinal principles of democracy. It implies that every individual has equal opportunity in earning his livelihood and in enjoying a fuller life according to his ability. This conception of equality lays stress on vocational aim of education.

Its value in modern times

Vocational education is necessary for the pupil in the present civilization of a complex nature. It is impossible to take education as a means for leisure. The aim of education is not only to improve the mind but to acquire ability for earning livelihood. This is due to the fact that it is the main duty of man to acquire ability for earning livelihood. The unemployed and the idle are the burden of society. The problem of unemployment is acute in the present society. This has drawn the attention of man to the vocational aim of education.

Much emphasis is laid on the vocational aim of education in the socialistic pattern of society because unemployment brings despair to man and produces lawlessness in society.

Its defects

Occupation according to ability must be the basis of vocational education. The aim of vocational education is to make the pupil suitable for the present industrial society. Consequently, vocational education is being neglected. The aim of education is more or less industrial in outlook and the study of science is more in demand than liberal education. Even, general education is taken as ability for earning livelihood. This has led to the general belief that literature, philosophy and history have no cultural value and that these subjects are studied according to social demand. Special attention given to the vocational aim of education has led to the belief that special knowledge or special training is real education. Special knowledge cannot, however, be acquired by all. It is the privilege of the few to acquire such knowledge.

The present society is based on competition and preservation of personal interests. Man must become an expert or a specialist to establish himself in society. This is hampering the growth of individuality in man. The number of men engaged in each profession is being determined by social demands. Education now does not look to the eagerness, taste and innate nature if the pupil. It compels him to make choice of his profession according to social demands. This system is injurious to man and society.

Acceptable aim of vocational education

In conclusion, it may be said that the aim of education becomes abortive if it is one sided. The development of individuality in man must be the aim of education. Its aim does not consist merely in the acquisition of ability to earn a livelihood. Education must not be entirely vocational. It must be cultural as well. There is no limitation to the value of education in life of man. Its sole aim is to preserve what exists in society.
The value of human life is not to be judged by the standard of material success. Education is not to put emphasis on a particular inclination of the pupil only, it must aim at the development of his intellect, perception, free will and sense of social duty. This is because education is not an isolated part of life, it is the reflection of the entire life of man.

**Types of professional and vocational education**

Professional and vocational education generally includes the following types—

1. Medical education,
2. Engineering and Technological education,
3. Industrial education,
4. Legal education,
5. Commercial education,
6. Agricultural education,
7. Forestry education,
8. Art and craft education,

**Functions**

The function of professional and vocational education may be described as two-fold, (a) to meet the needs of industry and commerce for properly trained workers of all grades and (b) to provide a suitable form of education for those boys and girls whose natural abilities can best be developed by instruction on practical lines.

Professional and vocational education should be regarded as an integral part of any educational system and is in no way inferior to education of the General type.

Professional and vocational education must include commercial education and act in relation to industry. Agricultural, legal and other types if professional education should also be regarded as an essential branch of professional education.

In order to provide suitable instruction and training for the different type of workers required, there are the following main types of vocational instructions:

(a) Industrial or Trade Schools.
(b) Labour Training Institutes.
(c) Technical Schools.
(d) Senior Technical Institutes.
(e) Polytechniques.
(f) College of Engineering and Technology.
(g) Institute of Technology or Engineering University.

The first and second normally provide full time instruction preparatory to employment while the third provide part-time instruction for those already in employment. Part-time instruction is held during the evening.
INTRODUCING EDUCATION

Medical

There are Medical schools and colleges. There are also centres for para-medical course. In India Medical Schools have been close down after independence. Provision of Post-Graduate teaching in different branches of medical science has been opened of late. There are also School of Nursing and Nurse-Training Centres.

Law

Law Colleges and Law Departments of some Universities cater to the needs of the students who intend to take up legal profession. The duration of law course is three years after graduation. But of late The Bar Council of India has recommended a five-year course after +2 stage. Some Universities have accepted that recommendation.

Agriculture, Veterinary, Dairy and Forestry

The subjects of Agriculture, Veterinary Science and Forestry have been expanding now-a-days. Several colleges and universities have been established which attracted an increasing number of students. Facilities for research work has also been progressed. Attempts to train for vocational competence in farming in +2 stages are being made.

Commerce

Commercial education made a rapid progress in every country. A network of commercial schools and colleges can be found in every country.

Teacher’s Training

The necessity of establishing training institutions for different categories of teachers has been felt. Consequently the number of such institutions has steadily increased.

What should be the purpose of General and Vocational or Technical education

It is still felt in our country that professional and vocational education at the school level is an inferior form of education, fit only for those who fail in general education and the last choice of parents and students. Too sharp a distinction however should not be drawn between general and special education. General education should introduce children to the world of work and to an understanding of science and technology. Technology itself is evolving so rapidly that a student who receives only a narrow and specialized training to the exclusion of general education in the sciences and humanities will quickly find his skills outdated and lacking an adequate base for rapid retraining and ill-fitted for the complexity of the demands of the modern world. Therefore, while all general education should contain some technical education of a pre-vocational nature, all special education (vocational) should also contain an appropriate element of general education. General education without special education is unpractical and special educational without general education is inhuman.
Comment

In conclusion, it may be said that while it is the duty of educational institutions to give special education to young men, they may be trained for special work in the country either because of the need of the country is because of the aptitude of the young. It is also their duty to see that the occupational mannerisms outlook and prejudices do not obscure this common humanity of all. These educational institutions must provide all its pupils with a common background of some sort which will be a link between the plumber and the solicitor, the farmer and the factory mechanic. ‘It is common observation’ says Prof. Earnest Barker, ‘that men’s minds are subdued to what they work in and that their ideas, assumptions and outlook on life may all be coloured by the material they handle and the temper they insensibly form in the course of their heavy work.’ It is the part of the duty of school to keep the wider outlook, to see the whole as well as the parts, and while making good thinkers, good workmen, and good tradesmen, to make them all equally men and women. And this can only be done by effective general education.
INTRODUCING EDUCATION

Chapter - 8


NATIONAL POLICY OF EDUCATION, 1968, 1979 & 1986

In pursuance of the desire made by the Kothari Commission (1964-66) the Government of India in 1968 announced some important principles for the onward march of education in the country.

Objective of the Policy

The Central Government has categorically stated in the National Policy on Education in 1968 that great efforts should be made for the early fulfilment of the Directive principle Under Article 45 of the Constitution, seeking to provide free and compulsory education for all children up to the age of 14. Suitable programmes should be developed to reduce the wastage and stagnation in schools and to ensure that every child who is enrolled in school completes the prescribed course.

Language Policy

The development of Indian languages and literature is a mist for educational and cultural development. Unless this is done, the creative energies of the students will remain suppressed and naturally standards of education will not improve. Knowledge will not spread to the people and the gulf between the intelligentsia and the masses will not be removed. Regional languages are already in use as media of education at the primary and secondary stages. Arrangement should be made for their use in the University stage also.

At the secondary stage, the state governments should adopt, and vigorously implement, the three language formula. Special emphasis should also be given to the study of English. Strenuous efforts should be made to equalize educational opportunity. Regional imbalances in educational facilities should be removed and tolerable educational facilities should provided in rural and other backward areas. For the promotion of social cohesion and national integration the common school system as suggested by the Kothari Commission should be adopted. Efforts should also be made to improve the standard of education in the prevailing schools. The education of girls should receive special attention, not only on grounds of social justice, but also because it accelerates social transformation. Education for the backward classes and the tribal people should receive more emphasis. Educational facilities for the physically and mentally handicapped children should be enlarged.

School and the Community

The school and the community should be brought closer through suitable programmes of mutual service and support. Work-experience and national service including participation
in meaningful and challenging programmes of community service and national reconstruction should become an important part of education. The main objective of these programmes is to arouse a sense of involvement in the common interest of the society and the community.

**Educational opportunities**

Educational opportunity at the secondary level is one of the instruments of social change. And as such facilities for secondary education should be enlarged. Stress should also be given to vocational education. Higher education should be so organized as to meet the needs of the students. Laboratory, library and other facilities in the Colleges and Universities should be enlarged. New Universities should be established with caution. An adequate provision of funds should be made before opening a new University. Special attention should be given to the organization of postgraduate courses and to the improvement of standards of training and research at this level.

**Part-time education and correspondence Courses**

Part-time education and correspondence courses should be elaborately arranged by the Universities. Such facilities should also be extended to students aspiring for higher education. Teachers, agricultural, industrial and other workers should also be encouraged to take this opportunity of getting advanced education. Furthermore education through part-time and correspondence courses should be given the same status as full-time education. Such facilities will promote the cause of education and provide opportunities of the large number of people desirous of getting advanced education without enrolling themselves as full-time students.

**Literacy Programme**

Alongside primary education, universal literacy or the liquidation of mass illiteracy is pivotal for a nation’s social and economic progress. The rise in the level of an individual’s awareness such as literacy ushers in, is instrumental for the release of productive forces in society, providing the pre-condition for hastening the pace of growth in industry and agriculture and for the removal of diverse social evils. Hence universal literacy has to occupy the top place in the National education policy of all emerging nations. Teacher and students should be actively involved in organizing literacy campaigns, especially as part of the social and National service programme. It will be advantageous to have a broad uniform educational structure in all parts of the country. The ultimate objective should be to adopt the 10 + 2 + 3 pattern.

**Complexity of the problem**

To Government of India recognizes that reconstruction of education is no easy task. Not only are the resources scarce the problems are complex. But considering the important role of education in the development of the country the Government of India, will in addition
to undertaking programmes on the central sector, assist the state governments for the
development of educational programmes of national importance where co-ordinated action
on the part of the states and centre is called for. The Government of India will also review,
every five years the progress made and recommend guidelines for future development.

Poor achievement

The analysis of developments over the last two decades makes it clear that desired
improvements have not materialized because neither the resources nor the measures for
reconstructing were commensurate with the imaginative and purposeful thrust of the
education policy adopted in 1968.

Changes made

Education is concerned essentially with the future. It has a holistic character. Therefore,
everyone capable of contribution to it has a duty and responsibility to do so. If the new
generation entering the 21st century finds itself ill-equipped educationally. It will hold the
present generation responsible for it. So education is a national responsibility. The new
education policy, it is expected, will succeed to the extent it reflects the total commitment
of the nation to accord priority to the development of our human resources.

In 1979 the educational policy was reoriented though the basic aims were the same as
those of 968 policy. Greater flexibility in content and duration of various courses was
provided for. The 1979 draft policy also envisaged de-linking of jobs from degrees. Before
parliament could approve the policy the Janata Government collapsed. The Congress (1)
Government headed by Mrs., Indira Gandhi pursued the 1968 national policy and
programmes virtually ignoring the changes made in the 1979 draft.

Before 1976 education was a State-Subject. The Central Government was concerned
directly only with certain areas such as co-ordination and determination of standards in
technical and higher education. According to a constitutional amendment of the Union and
State Governments the primary responsibility continues to be that of the states.

Meanwhile the 1968 policy continues to serve as the basis for educational development; it
is supplemented by the guidelines adopted in the sixth plan document. The most important
of these programmes relates to universalisation of elementary education and eradication of
adult illiteracy.

Education is free upto lower secondary (class X) stage in 11 states and seven Union
Territories. It is free for girls in six states. Education at the higher secondary stage (+2) is
free in six states including West Bengal.

Dismal Features

Educational surveys have revealed some disconcerting facts about school education. The
N.C.E.R.T. for instance found in 1982 that of the 4,86000 primary schools catering to
about 700 lakh children 53 percent have no pucca buildings, 40 percent no black-boards, 33 percent no drinking water facilities, 71 percent no libraries, 66 percent no urinal or lavatory facilities, 35 percent are managed by single teacher while several have no teachers.

The UGC disclosed in may 1984 that number of Universities increased from 28 in 1950-51 to 120 in 1982-83 (now 140), the number of colleges rose from 695 to 5039 (seven-fold increase) number of t264 to 2, 11, 761 (a ten-fold increase) and the enrollment in Universities went up from 1-7 lakh to 32 lakh (an 18-fold increase). But there was no great impact on the overall national achievement.

The low standard of academic attainments is evident from the fact that only 15 present of the students get 50 percent marks after three years of college education, the other either drop out or get less than 50 percent marks. As many as 85 percent of the students fell under the category of ‘rejects’. Such a system is wasteful no doubt. The wastage is over 50 percent upto the primary level, over 70 percent upto the middle stage and over 80 percent upto the secondary level. The number of illiterates aged 15 and above rose sharply in the country between 1970 and 1980 - from 208.1 million to 243, 1 million. Although literacy has improved from 16.67 percent of the population in 1951 to 36.23 in 1981, female literacy figures are demoralizing. More than 75 percent of Indian women could not read or write in 1981. The gap between the male the female literacy percentages has widened in the three decades of planned development - from 17.02 percent in 1951 to 22.07 percent in 1981.

The 10+2 system was introduced in the mid seventies but several states have not adopted it. In the states which adopted the scheme, its working has been far from satisfactory, specially because of the failure of its vocational side.

**Challenges of Education**

Indications of radical changes in the present faulty education system and a new policy were given in an official paper entitled challenges of Education-policy perspective presented to the Parliament in August 1985. The new policy should seek to integrate the requirements of universalisation of elementary education, production of trained manpower to deal effectively with new technologies, diversified vocationisation and the creation of an overall environment for development through adult and continuing education. The paper lays particular emphasis on vocational programme as part of 10+2 stage of secondary education and also before the stage and outside the system. The paper explains that education is a complex subject with wide-ranging ramification and definitive views and a new policy cannot be finalized without consulting the decision-makers in the state and central governments, parliamentarians, educationists, intellectuals, teachers, parents, students and captains of industries.
The document aims at provoking discussion by stating various viewpoints in a forthright manner. There is a widespread feeling the paper says, that the system cannot be improved by marginal changes and that this is the time for attempting a radical transformation. Education will have to be streamlined to facilitate modernization of production, services and infrastructure. Besides to enable young people to develop entrepreneurial ability, they will have to be exposed to challenges of new ideas and unfamiliar situations.

**Comment**

In short, the policy document adopted the familiar diagnosis. The main difference is in respect of emphasis and effective implementations, so as to achieve the prescribed targets. Old concepts have been replaced by new ones in an efforts to overcome the resources constraints and impart dynamism. Mr. Rajiv Gandhi’s concept of developing human resources scientifically so as to ensure adequate participation in the modern world’s technological revolution and meet the probable challenges of the 21st century was admittedly praiseworthy.

**NATIONAL POLICY OF EDUCATION, 1986**

**The Essence and Role of Education**

In our national perception education is essentially for all. This is fundamental to our all-round development, material and spiritual.

Education refines sensitivities and perceptions in the present and the future. This cardinal principle is the key to the National Policy on Education.

**Characteristics of Natural system of Education**

The Constitution embodies the principles on which the National System of Education is conceived of.

The concept of a National System of Education implies that, up to a given level, all students, irrespective of caste, creed, location or sex, have access to education of a comparable quality. To achieve this, the Government will initiate appropriately funded programmes. Effective measures will be taken in the direction of the common School System recommended in the 1968 Policy.

The National System of Education envisages a common educational structure. The 10+2+3 structure has now been accepted in all parts of the country. Regarding the further break-up of the first 10 years efforts will be made to move towards as elementary system comprising 5 years of primary education, 3 years of upper primary, followed by 2 years of High School.
Bases of National system of Education in India

The National system of Education will be based on a National curricular framework which contains a common core along with other components that are flexible. The common core will include the history of India’s freedom movement, the constitutional obligations and other content essential to nurture national identity. These elements will cut across subject areas and will be designed to promote values such as India’s common cultural heritage, egalitarianism, democracy and secularism, equality of the sexes, protection of the environment, removal of social barriers, observance of the small family norm and inculcation of the scientific temper. All educational programmes will be carried on in strict conformity with secular values.

India has always worked for peace and understanding between nations, treating the whole world as one family. True to this hoary tradition. Education has to strengthen this world view and motivate the younger generations for international co-operation and peaceful co-existence. This aspect cannot be neglected.

To promote equality, it will be necessary to provide for equal opportunity to all not only in access, but also in the conditions for success. Besides, awareness of the inherent equality of all will be created through the core curriculum. The purpose is to remove prejudices and complexes transmitted through the social environment and the accident of birth.

Minimum levels of learning will be laid down for each stage of education. Steps will also be taken to foster among students an understanding of the diverse cultural and social systems of the people living in different parts of the country. Besides the promotion of the link language, programmes will be launched to increase substantially the translation of book from one language to another and to publish multi-lingual dictionaries and glossaries. The young will be encouraged to undertake the rediscovery of India, each in his own image and perception.

In higher education in general, and technical education in particular, steps will be taken to facilitate inter-regional mobility by providing equal access to every Indian of requisite merit, regardless of his origins. The universal character of universities and other institutions of higher education is to be underscored.

In the areas of research and development, and education in science and technology, special measures will be taken to establish network arrangements between different institution in the country to pool their resources and participate in projects of national importance.

The Nation as a whole will assume the responsibility of providing resource support for implementing programmes of educational transformation, reducing disparities, universalisation of elementary education, adult literacy, scientific and technological research etc.
Life-long education is a cherished goal of the educational process. This presupposes universal literacy. Opportunities will be provided to the youth, housewives, agricultural and industrial workers and professionals to continue the education of their choice, at the space suited to them. The future must and will be in the direction of open and distance learning.

Other institutions which will be strengthened to play an important role in giving shape to the National System of Education are the University Grants Commission, the All India Council of Technical Education. The Indian Council of Agricultural Research and the Indian Medical Council. Integrated planning will be instituted among all these bodies so as to establish functional linkages and reinforce programmes of research and post-graduate education. These, together with the National Council of Educational Research and Training and the National Institute of Educational Planning and Administration, will be involved in implementing the Education Policy.

**Centre-States relations in the field of Education**

The Constitutional Amendment of 1976, which includes Education in the Concurrent List, was a far-reaching step whose implications- substantive, financial and administrative-require a new sharing of responsibility between the Union Government and the States in respect of this vital area of national life. While the role and responsibility of the States in regard to education will remain essentially unchanged, the Union Government would accept a larger responsibility to reinforce the national and integrative character of education, to maintain quality and standards (including those of the teaching profession at all levels), to study and monitor the educational requirements of the country as a whole in regard to manpower for development, to cater to the needs of research and advanced study, to look after the international aspects of education, culture and Human Resource Development and, in general, to promote excellence at all levels of the educational partnership which is at once meaningful and challenging, and the National Policy will be oriented towards giving effect to it in letter and spirit.

**Education for women’s equality**

The new Policy laid special emphasis on the removal of disparities and to equalize educational opportunity by attending to the specific needs of those who have been denied quality so far. Education would be used as an agent of basic change in the status of woman. In order to neutralize the accumulated distortions of the past, there will be a well-conceived edge in favour of women. The National Education system would play a positive, interventionist role in the empowerment of women. It would foster the development of new values through redesigned curricula, text-books, the training and orientation of teachers, decision-makers and administrators, and the active involvement of educational institutions. This will be an act of faith and social engineering. Women’s studies will be promoted as a part of various programmes to further women’s development.
The removal of women’s illiteracy and obstacles inhibiting their access to, and retention in, elementary education will receive overriding priority, through provision of special support services, setting if time targets, and effective monitoring. Major emphasis will be laid on women’s participation in vocational, technical and professional education at different levels. The policy of non-discrimination will be pursued vigorously to eliminate sex stereo-typing in vocational and professional courses and to promote women’s participation in non-traditional occupations, as well as in existing and emergent technologies.

**The Education of Scheduled Castes**

The central focus in the SC’s educational development is their equalization with non-SC population at all stages and levels of education, in all areas and in all the four dimensions rural male, rural female, urban male and urban female.

The measures contemplated for this purpose under the new policy include: Incentive to indigent families to send their children to school regularly till they reach the age of 14;

Pre-matric Scholarship scheme for children of families engaged in occupations such as scavenging, flaying and tanning to be made applicable from Class 1 onwards. All children of such families, regardless of incomes, will be covered by this scheme and time-bound programmes targeted on them will be undertaken:

Special steps to provide non-formal education to SC children who dropout of school in large numbers, and well-designed programmes of adult education:

Constant micro-planning and verification to ensure that the enrollment retention and successful completion of courses by SC students do not fall at any stage, and provision of remedial courses to improve their prospects for further education and in employment;

The recruitment of teachers from scheduled castes which will receive particular attention;

Provision of facilities for SC students in hostels at district headquarters, according to a phased programme;

The location of school building Balwadis and Adult Education Centres in such a way as to facilitate full participation of the Scheduled Castes;

The utilization of N.R.E.P. and R.L.E.G.P. resources as to make substantial educational facilities available to the Scheduled Castes;

Constant innovation in finding new methods to increase the participation of the Scheduled Castes in the educational process.

**Reorganisation of Education at Different Stages of Early Childhood Care & Education**

The National policy on Children specially emphasizes investment in the development of the young child, particularly children from sections of the population in which first generation learners predominate.
Recognising the holistic nature of proper child development viz, nutrition, health and social, mental, physical, moral and emotional development. Early childhood care and Education (ECCE) will receive high priority and be suitably integrated with the Integrated Child Development Services programme, wherever possible. Day-care centres will be provided as a support services for universalisation of primary education, to enable girls engaged in taking care of siblings to attend school and as a support service for working women belonging to poorer sections.

Programmes of ECCE will be child-centred, focused around play, and the individuality of each child and will discourage formal methods or the early introduction of the 3 R’s. The local community will be fully involved in these programmes.

A full integration of child care and pre-primary education will be brought about, both as a feeder and a strengthening factor for primary education and to human resource development in general. In continuation of this stage, the School Health Programme will be strengthened.

**Elementary Education**

The new thrust in elementary education will emphasise two aspects: (i) universal enrollment and universal retention of children upto 14 years of age, and (ii) a substantial improvement in the quality of education.

**Child-centred**

A warm, welcoming and encouraging approach, in which all concerned share a solicitude for the needs of the child, is the best motivation for the child to attend school and learn. A child-centred and activity-process of learning should be adopted at the primary stage. First generation learners should be allowed to set their own pace and be given supplementary remedial instruction. As the child grows, the component of cognitive earning will be increased and skills organized through practice. The policy of non-detention at the primary stage will be retained, making evaluation as disaggregated as feasible. Corporal punishment will be firmly excluded from the educational system and school timings as well as vacations adjusted to the convenience of children.

**School Facilities**

Provision will be made of essential facilities in primary schools, including at least two reasonably large rooms that are usable in all weather, and the necessary toys, blackboards, maps, charts, and other learning material. At least two teachers, one of whom a women, should work in every school, the number increasing as early as possible to one teacher per class. A phased drive, symbolically called Operation Blackboard will be undertaken with immediate effect to improve Primary Schools all over the country. Government, local bodies, voluntary agencies and individuals will be fully involved.
Non-formal Education

A large and systematic programme of non-formal education will be launched for school drop-outs, for children from habitations without schools, working children and girls who cannot attend whole-day schools.

Modern technological aids will be used to improve the learning environment of NFE centres. Talented and dedicated young men and women from the local community will be chosen to serve as instructors, and particular attention paid to their training. Steps will be taken to facilitate their entry into the formal system in deserving cases. All necessary measures will be taken to ensure that the quality of non-formal education is comparable with formal education.

Effective steps will be taken to provide a framework for the curriculum on the lines of the national core curriculum, but based on the needs of the learners and related to the local environment. Learning material of high quality will be developed and provided free of charge to all pupils. NFE programmes will provide participatory learning environment, and activities such as games and sports, cultural programmes, excursions, etc.

Much of the work of running. NFE centres will be done through voluntary agencies and Panchayati Raj institutions. The provision of funds to these agencies will be adequate and timely. The Government will take over-all responsibility for this vital sector which is not yet fully established.

Conclusion

The New Education Policy will give the highest priority to solving the problem of children dropping out of school and will adopt an array of meticulously formulated strategies based on micro-planning, and applied at the grass-roots level all over the country, to ensure children’s retention at school. This effort will be fully co-ordinated with the network of non-formal education. It shall be ensured that all children who attain the age of about 11 years by 1990 will have had five years of schooling, or its equivalent through the non-formal stream. Likewise, by 1995 all children will be provided free and compulsory education upto 14 years of age.

Secondary Education

Secondary education begins to expose students to the differentiated roles of science, the humanities and social sciences. This is also an appropriate stage to provide children with a sense of history and national perspective and give them opportunities to understand their constitutional duties and rights as citizens. Conscious internalisation of a healthy work ethos and of the values of a humane and composite culture will be brought about through
appropriately formulated curricula. Vocationalisation through specialized institutions or through the re-fashioning of secondary education can, at this stage provide valuable manpower for economic growth. Access to secondary education will be widened to cover areas unserved by it at present. In other areas, the main emphasis will be on consolidation.

**Pace-setting Schools or Navodaya Vidyalayas**

It is universally accepted that children with special talent or aptitude should be provided opportunities to proceed at a faster pace, by making good quality education available to the, irrespective of their capacity to pay for it.

Pace-setting schools intended to serve this purpose will be established in various parts of the country on a given pattern, but with full scope for innovation and experimentation. Their broad aims will be to serve the objective of excellence, coupled with equal and social justice (with reservation, for SCs and STs), to promote national integration by providing opportunities to talented children largely rural, from different parts of the country to live and learn together to develop their full potential and, most importantly, to become catalysts of a nation-wide programme of school improvement. The schools will be residential and free-of-charge. These Navodaya Vidyalayas will be distinct from the Kendriya Vidyalayas.

**Vocationalisation**

The introduction of systematic, well-planned and rigorously implemented programmes of vocational is crucial in them proposed education’s reorganization. These elements are meant to enhance individual employability, to skilled manpower, and to provide an alternative for those pursuing higher education without particular interest or purpose.

Vocational education will be a distinct stream; intended to prepare students for identified occupations spanning several areas of activity. These course will ordinarily be provided after the secondary stage, but keeping the scheme flexible, they may also be made available after Class VIII. In the interests of integrating vocational education better with their facilities the Industrial Training Institutes will also conform to the large vocational pattern.

Health planning and health service management should optimally interlock with the education and training of appropriate categories of health manpower through health-related vocational course. Health education at the primary and middle levels will ensure the commitment of the individual to family and community health, and lead to health-related vocational courses at the +2 stage of higher secondary education. Efforts will be made to devise similar vocational courses based on Agriculture. Marketing Social Services, etc. An emphasis in vocational education will also be on development of attitudes, knowledge, and skills for entrepreneurship and self-employment.

The establishment of vocational course or institutions will be the responsibility of the government as well as employers in the public and private sectors; the government will,
however, take special steps to cater to the deprived sections of society. Appropriate programmes will also be started for the handicapped.

Graduates of vocational courses will be given opportunities, under pre-determined conditions, for professional growth, career improvement and lateral entry into courses of general, technical and professional education through appropriate bridge courses.

Non-formal, flexible and need-based vocational programmes will also be made available to neoliterates, youth who have completed primary education, school dropouts, persons engaged in work and un-employed or partially employed persons. Special attention in this regard will be given to women.

Tertiary level courses will be organised for the young who graduate from the higher secondary courses of the academic stream and may also require vocational courses.

It is proposed that vocational courses cover 10 percent of higher secondary students by 1990 and 25 percent by 1995. Steps will be taken to see that a substantial majority of the products of vocational courses are employed or become self-employed. A review of its recruitment policy to encourage diversification at the secondary level is recommended.

Higher Education

Higher education provides people with an opportunity to reflect on the critical, social, economic, cultural, moral and spiritual issues facing humanity. It contributes to national development through dissemination of specialized knowledge and skills. It is therefore a crucial factor for survival. Being at the apex of the educational pyramid, it has also a key role in producing teachers for the education system.

In the context of the un-precedented explosion of knowledge, higher education has to become dynamic as never before, constantly entering uncharted areas.

There are around 150 universities and about 5,000 colleges in India today. In view of the need to effect an all-round improvement in these institutions. It is proposed that, in the near future, the main emphasis will be on the consolidation of, and expansion of facilities in the existing institutions.

Urgent steps will be taken to protect the system from degradation.

In view of mixed experiences with the system of affiliation, autonomous colleges will be helped to develop in large numbers until the affiliating system is replaced by a freer and more creative association of universities with colleges. Similarly, the creation of autonomous departments within universities on a selective basis will be encouraged. Autonomy and freedom will be accompanied by accountability.

Courses and programmes will be redesigned to meet the demands of specialization better. Special emphasis will be laid on linguistic competence. There will increasing flexibility in the combination of courses.
State level planning and co-ordination of higher education will be done through Councils of Higher Education. The UGC and these Councils will develop co-ordinative methods to keep a watch on standards.

Provision will be made for minimum facilities and admission will be regulated according to capacity. A major effort will be directed towards the transformation for teaching methods. Audiovisual aids and electronic equipment will be introduced to streamline development of science and technology, curricula and material, research, and teacher orientation. This will require preparation of teachers at the beginning of the service as well as continuing education thereafter. Teacher’s performance will be assessed systematically. All post will be filled entirely on the basis of merit.

Research in the universities will be provide with enhanced support and steps will be taken to ensure its high quality. Suitable mechanism will be set up by the UGC for co-ordination research in the universities, particularly in thrust areas of science and technology, with research undertaken by other agencies. An effort will be made to encourage the setting up of national research facilities within the university system, with proper forms of autonomous management.

Research in Indology, the humanities and social sciences will receive adequate support. To fulfill the needs for the synthesis of knowledge, inter-disciplinary research will be encouraged. Efforts will be made to delve into India’s ancient fund of knowledge and to relate it to contemporary reality. This effort will imply the development of facilities for the intensive study of Sanskrit and other classical language.

In the interests of greater co-ordination and consistency in policy, sharing of facilities and developing inter-disciplinary research, a national body covering higher education in general, agricultural, medical, technical, legal and other professional fields will be set up.

**De-linking Degrees from Jobs**

A beginning will be made in de-linking degrees from jobs in selected areas.

The proposal cannot be applied to occupation-specific courses like Engineering, Medicine, Law, Teaching, etc. Similarly, the services of specialists with academic qualifications in the humanities, social sciences, sciences, etc, will continue to be required in various job positions.

The de-linking- will be applied in services for which a university degree need not be a mandatory option of job-specific courses and afford greater justice to those candidates who, despite being equipped for a given job, are unable to get it because of an unnecessary preference for graduate candidates.

Concomitant with de-linking, an appropriate machinery, such as a National Testing Service, will be established, in appropriate phase, to conduct tests on a voluntary basis to determine the suitability of candidates for specified jobs and to pave the way for the emergence of norms of comparable competence across the nation.
**Rural University**

The new pattern of the Rural University will be consolidated and developed on the lines of Mahatma Gandhi’s revolutionary ideas on education so as to take up the challenges of micro-planning at grass-root levels and the transformation of rural areas. Institutions and programmes of Gandhian basic education will be supported.

**Technical and Management Education**

It is essential to look at technical and management education together, in view of their close relationship and complementary concerns. The re-organisation of Technical and Management Education should take into account the anticipated scenario by the turn of the century, with specific reference to the likely changes in the economy, social environment, production and management processes, the rapid expansion of knowledge and the great advances in sciences and technology.

The infrastructure and services sectors as well as the un-organised rural sector also need a greater induction of improved technologies and a supply set up Technical Manpower Information System will be further developed and strengthened.

Continuing education, covering established as well as emerging technologies, will be promoted.

As computers have become important and ubiquitous tools, a minimal exposure to computers and a training in their use will form part of professional education. Programmes of computer literacy will be organized on wide scale from the school stage.

In view of the present rigid entry requirements to formal courses restricting the access of a large segment of people to technical and managerial education, programmes through a distance-learning process, including use of the mass media, will be offered. Technical and management education programmes, including polytechnics, will also be on a flexible modular pattern based on credits, with provision for multi-point entry. A strong guidance and counseling service will be provided.

In order to increase the relevance of management education, particularly in the non-corporate and under-managed sectors, the management education system will study and document the Indian experience and create’s body of knowledge and specific educational programmes suited to these sectors.

Appropriate formal and non-formal programs of technical education relevant to their skills will be devised for the benefit of women, the economically and socially weaker sections, and the physically handicapped.

The emphasis on vocational education and its expansion will need a large number of teachers and professionals in vocational education, educational technology, curriculum development, etc. Programmers will be started to meet this demand.
To encourage students to consider “self-employment” as a career option, training in entrepreneurship be provided through modular or optional courses, in degree or diploma programmes.

In order to meet the continuing needs of updating curriculum, renewal, should systematically phase out obsolescence and introduce new technologies or disciplines.

**Institutional Thrusts**

Some polytechnics in the rural areas have started training weaker groups in rural areas for productive occupations through a system of community polytechnics. The community polytechnic system will be appraised and appropriately strengthened to increase its quality and coverage.

**Innovation, Research and Development**

Research as a means of renovation and renewal of educational processes will be undertaken by all higher technical institutions. It will primarily aim at producing quality manpower capable of taking up R & D functions. Research for developing will focus on improving present technologies, developing new indigenous ones and enhancing production and productivity. A suitable system for watching and forecasting technology will be set up.

The scope for co-operation, collaboration, and networking relationships between institutions at various levels and with the user systems will be utilized, proper maintenance, and an attitude of innovation and improvement in daily life, will be promoted systematically.

**Promoting Efficiency and Effectiveness at all Levels**

As technical and management education is expensive, the following major steps will be taken for cost-effectiveness and to promote excellence:

(i) High priority will be given to modernization and removal of obsolescence. However, modernization will be undertaken to enhance functional efficiency and not for its own sake or as a status symbol:

(ii) Institutions will be encouraged to generate resources using their capacities to provide services to the community and industry. They will be equipped with up-to-date learning resources, library and computer facilities.

(iii) Adequate hostel accommodation will be provided, specially for girls. Facilities for sports, creative work and cultural activities will be expanded:

(iv) More effective procedures will be adopted in the recruitment of staff. Career opportunities will be enhanced and improvements effected in service consultancy norms and other perquisites.
(v) Teachers will have multiple roles to perform: teaching, research and development of learning resource material, extension and administration or managing the institution. Initial and in-service training will be made mandatory for faculty members and adequate training reserves will be provided. Staff Development Programmes will be integrated at the state and co-ordinated at Regional and National levels.

(vi) The curricula of technical and management programmes will be targeted on current as well as the projected needs of industry or user systems. Active interaction between technical or management institutions and industry will be promoted in programme planning and implementation, exchange or personnel, training facilities and resources, research and consultancy and others areas of mutual interest.

(vii) Excellence in performance of institutions and individuals will be recognized and rewarded. The emergence of sub-standard and mediocre institutions will be checked. An institutional climate conducive to excellence will be promoted with full faculty involvement.

(viii) Select institutions will be awarded academic, administrative and financial autonomy of varying degrees, building in safeguards with respect to accountability.

(ix) Networking systems will have to be established between technical education and industry. R&D organization, programmes of rural and community development and with other sectors of education with complementary characteristics.

Making the System work

It is obvious that these and many other new tasks of education cannot be performed in a stage of disorder. Education needs to be managed in an atmosphere of utmost intellectual rigour, seriousness of purpose and, at the same time, of freedom essential for innovation and creativity. While far-reaching changes will have to be incorporated in the quality and range of education, the process of introducing discipline into the system will have to be started, here and now, in what exists.

The country has placed a boundless trust in the educational system. The people have a right to expect concrete results. The first task is to make it work. All teachers should teach and all students study.

The strategy in this behalf will consist of-

(a) A better deal to, and the greater accountability of teachers;

(b) Provision of improved student’s services and insistence on observance of acceptable norms of behaviours;
INTRODUCING EDUCATION

(c) Provision of a threshold of facilities to institutions; and

(d) Creation of a system of performance appraisals of institutions according to standards and norms set at the National or State levels.

Re-orienting the content and process of education

The cultural perspective: The existing schism between the formal system of education and the country’s rich and varied cultural traditions needs to be bridged. The pre-occupation with modern technologies should not be allowed to sever new generations’s roots in India’s history and culture. De-culturisation, de-humanisation and alienation must be avoided at all costs. Education can and must be about the fine synthesis between change-oriented technologies and the country’s continuity of cultural traditions.

The curricula and processes of education will be enriched by cultural content in as many manifestations as possible. Children will be enabled to develop sensitivity to beauty, harmony and refinement. Resource persons in the community, irrespective of their normal educational qualifications, will be invited to contribute to the cultural enrichment of education, employing both the literate and oral traditions of communication. To sustain and carry forward the cultural tradition, the role of old masters, who train pupils through traditional modes will be supported and recognized.

Linkages will be established between the university system and institutions of higher learning in art, archaeology, oriental studies etc. Due attention will also be paid to the specialized disciplines of Fine Arts, Museology, Folklore etc. Teaching, training and research in these disciplines will be strengthened so as to replenish specialized manpower in them.

Value Education: The growing concern over the erosion of essential values and an increasing synicism in society has brought to focus the need for re-adjustments in the curriculum in order to make education a forceful tool for the cultivation of social, ethical and moral values.

In our culturally plural society the values that are to be fostered through education should have a universal appeal, and should be oriented towards the unity and integration of our people. Such value education should help eliminate obscurantism, religious fanaticism, violence, superstition and fatalism.

Apart from this combative role, value education has a profound positive content, based on our heritage, national and universal goals and perceptions. It should lay primary emphasis on this aspect.

The Education Policy of 1968 examined the question of the development of languages in great detail; its essential provisions can hardly be improved upon and are as relevant today as before. The implementation of this part of the 1968 Policy has, however, been uneven. The policy will be implemented more energetically and purposefully.
Books and Libraries: The availability of books at low prices is indispensable for a people’s education. Effort will be made to secure easy accessibility to books for all segments of the population. Measures will be taken to improve the quality of books, promote the reading habit and encourage creative writing. Author’s interests will be protected. Good translations of foreign books into Indian language will be supported. Special attention will be paid to the production of quality books for children, including text-book and work-books.

Together with the development of books, a nation-wide movement for the improvement of existing libraries and the establishment of new ones will be taken up. Provision will be made in all educational institutions for library facilities and the status of librarians improved.

Media and Educational Technology: Modern communication technologies have the potential to bypass several stages and sequences in the process of development encountered in early decades. Both the constraints of time and distance at once become manageable. In order to avoid structural dualism, modern educational technology must reach out to the most distant areas and the most deprived sections of beneficiaries simultaneously with the areas of comparative affluence and ready availability.

Educational technology will be employed in the spread of useful information, the training and re-training of teachers, to improve quality, sharpen awareness of art and culture, inculcate abiding values, etc., both in the formal and non-formal sectors. Maximum use will be made of the available infrastructure. In villages without electricity, batteries or solar packs will be used to run the programme.

The generation of relevant and culturally compatible educational programmes will form an important component of educational technology, and all available resources in the country will be utilised for this purpose.

The media has a profound influence on the minds of children as well as adults; some of it has encouraged consumerism, violence etc. and thus had a deleterious effect. Radio and TV. programmes which clearly militate against proper educational objectives will be prevented. Steps will be taken to discourage such trends in films and other media also. An active movement will be started to promote the production of children’s films of high quality and usefulness.

Work Experience: Work experience, viewed as purposive and meaningful manual work, organised as an integral part of the learning process and resulting in either goods or services which are useful to the community, is considered as an essential component at all stages of education, to be provided through well-structured and graded programmes. It would comprise activities in accordance with the interests, abilities and needs of students, the level of skills and knowledge to be upgraded with the stages of education. This experience would be helpful on his entry into the workforce. Pre-vocational programmes provided at
the lower secondary stage will also facilitate the choice of the vocational courses at the secondary stage.

**Education and Environment**: There is a paramount need to create a consciousness of the environment. It must permeate all ages and all sections of society, beginning with the child. Environmental consciousness should inform teaching in schools and colleges. This aspect will be integrated in the entire educational process.

**Sports and Physical Education**: Sports and physical education are an integral part of the learning process, and will be included in the evaluation of performance. A nation-wide infrastructure for physical education, sports and games will be built into the educational edifice.

The infrastructure will consist of play-fields, equipment, coaches and teachers of physical education as part of the School Improvement Programme. Available open space in urban areas will be reserved for playgrounds, if necessary by legislation. Efforts will be made to establish sports institutions and hostels where specialised attention will be normal education. Appropriate encouragement will be given to those talented in sports and games. Due stress will be laid on indigenous traditional games. As a system which promotes an integrated development of body and mind, Yoga will receive special attention. Effort will be made to introduce yoga in all schools; to this end, it will be introduced in teacher training courses.

**The Role of Youth**: Opportunities will be provided for the youth to involve themselves in national and social development through educational institutions and outside them. Students will be required to participate in one or the other of existing schemes, namely, the National Service Scheme, National Cadet Corps, etc. Outside the institutions, the youth will be encouraged to take up programmes of development, reform and extension. The National Service Volunteer Scheme will be strengthened.

**The Evaluation Process and Examination Reform**: Assessment of performance is an integral part of any process of learning and teaching. As part of sound educational strategy, examinations should be employed to bring about qualitative improvements in education.

The objective will be to re-cast the examination system so as to ensure a method of assessment that is a valid and reliable measure of student development and a powerful instrument for improving teaching. In functional terms, this would mean:

(i) The elimination of excessive element of chance and subjectivity;
(ii) The de-emphasis of memorisation;
(iii) Continuous and comprehensive evaluation that incorporates both scholastic and non-scholastic aspects of education, spread over the total span of instructional time;
(iv) Effective use of the evaluation process by teachers, students and parents;
(v) Improvement in the conduct of examinations;
(vi) The introduction of concomitant changes in instructional materials and methodology;
(vii) The introduction of the semester system from the secondary stage in a phased manner; and
(viii) The use of grades in place of marks.

The above goals are relevant both for external examinations and evaluation within educational institutions. Evaluation at the institutional level will be streamlined and the predominance of external examinations reduced.

**Resources and Review**

The Education Commission of 1964-66, the National Education Policy of 1968 and practically all others concerned with education have stressed that the egalitarian of Indian society can only be realised by making investments in education of an order commensurate with the nature and dimensions of the task.

Resources, to the extent possible, will be raised by mobilising donations, asking the beneficiary communities to maintain school buildings and supplies of some consumables, raising fees at the higher levels of education and effecting some saving by the efficient use of facilities. Institutions involved with research and the development of technical and scientific manpower should also mobilize some funds by levying a cess or charge on the user agencies, including Government departments, and entrepreneurs. All these measures will be taken not only to reduce the burden on State resources but also for creating a greater sense of responsibility within the educational system. However, such measures will contribute only marginally to the total funding. The Government and the community in general will find funds for such programmes as: the universalisation of elementary education; liquidating illiteracy; equality of access to educational opportunities to all sections throughout the country; enhancing the social relevance, quality and functional effectiveness of educational programmes; generating knowledge and developing technologies in scientific fields crucial to self-sustaining economic development; and creating a critical consciousness of the values and imperatives of national survival.

The deleterious consequence of non-investment or inadequate investment in education are indeed very serious. Similarly, the cost of neglecting vocational and technical education and of research is also unacceptable. Sub-optimal performance in these fields could cause irreparable damage to the Indian economy. The network of institutions set up from time to time since Independence to facilitate the application of science and technology would need to be substantially and expeditiously updated, since they are fast becoming obsolete.
In view of these imperatives education will be treated as a crucial area of investment for national development and survival. The National Policy on education, 1968, had laid down that the investment on education be gradually increased to reach a level of expenditure of 6% of the national income as early as possible. Since the actual level of investment has remained far short of that target, it is important that greater determination be shown now to find the funds for the programmes laid down in this Policy. While the actual requirements will be computed from time to time by close monitoring and review, it is proposed that the outlay on education here after would uniformly exceed the level recommended in the 1968 Policy.

The implementation and parameters of the New Policy must be reviewed every five years. Appraisals at short intervals will also be made to ascertain the progress of implementation and the trends emerging from time to time.

**Implementation made so far**

A major break-through has been made in regard to the implementation of the new education policy during 1988-89.

Although a start was made during the year 1968-87 wherein some of the programmes of the new Education Policy were initiated like the National open University, Navodaya Vidyalaya, finalisation of the National core curriculum, Mass Programme of Functional Literacy, Mass orientation of school teachers, Establishment of Autonomous Colleges, consolidation and quality improvement in higher Education removal of obsolescence and modernisation of Technical education etc.

The major initiative taken during 1988-89 for the implementation of the new Education Policy include the following: 112100 Primary Schools in 1720 blocks have been covered under the scheme Operation Blackboard, exceeding the target fixed for 1988-89, the State Governments/Union Territories/voluntary agencies have been assisted to set up 2 lakh non-formal education centre. 120 District institutions for Educational Training in 14 states have been established. The national curriculum framework has been formulated by the NCERT. The model curricula with minimum learning out-comes and common core components for all stages of school education has been published. The National Literacy Mission has been launched under which 30 million adults are expected to be made literate by 1990-91 and another 50 million by 1995. New guidelines have been framed and circulated for the Improvement of standards and qualities of education, reconstructing and diversification of courses in colleges and 50 colleges have been given autonomous status.

**Comments** : The new policy on Education aims at preparing the country for the 21st century. So it has set as its goal the production of trained manpower in adequate numbers to deal creatively with new techniques. This task is very important because of the expected competition Indian industry would be facing from abroad. The new policy also wants to bring technical education closer to manpower requirements. While the government stands
committed to the constitutional obligation to provide universal primary education, it does not think that this implies provision of formal education. Sixty-four million additional children will have to be given some form of schooling during the Seventh Plan period. But of these not more than 25 million can be given formal education. So the government has decided to opt for the non-formal system of education. The non-formal education is needed not only to supplement the formal one but also to change the orientation of primary education and teach children things which are of direct use to them. The establishment of the Indira Gandhi National Open University in Delhi marks a start in this direction. It has established regional centres in different parts of the country.

First, the National policy on education has rightly given emphasis to the education of the scheduled caste and scheduled tribes, the minorities and the handicapped. Secondly, it laid special emphasis on the removal of disparities by attending to the specific emphasis on the removal of disparities by attending to the specific needs of those who have been denied equality so far. This is praise worthy no doubt. Thirdly, it also sought help of the teachers, students, voluntary organisations and the educated people of the country in the fight against illiteracy. Fourthly, the new policy has taken into consideration the education of the pre-primary stage. The new policy laid particular emphasis on free and compulsory education for all school-going children. It also made special reference to the upgrading of the standard of primary education at the same time, fifthly, the new policy on Education (NEP) laid emphasis on vocational programmes as part of the 10+2 stage of secondary education and also before this stage and outside the system. This is commendable. Sixthly, the new policy has taken a bold step by d-linking degrees from jobs. Its implementation will change the educational scenario in never future. Seventhly, the new policy has given due wattage to Basic education. It is expected that the new pattern of the Rural University will effect a great change that the new pattern of the Rural University will effect a great change in the system of basic education. Work experience is to be organised as an integral part of the learning process and in turn will serve the purpose of basic education. Eighthly, one of the most important characteristics of the new policy is the faith on the work of education. It believes that education can bring about the fine synthesis between technological transformation of the country and its cultural traditions.

The new education policy is not faultless. Critics are of the opinion that implementation of the new policy will not be easy. There will be constraints of various types - economic, technological, financial and probably legal. First, the proposed change in the role, arrangement and importance of the examination system may be opposed by vested interests. Secondly, the new policy fails to take account of the baffling magnitude of the problem of education in achieving the cherished goals. The problem of over population and its consequent effect on the primary education has not been dealt properly. Thirdly, the question of arranging adequate finances remains unanswered. Fourthly, the policy of establishing pace-setting school (Navodaya Vidyalaya) in every district has been criticised. The critics
are of the opinion that the scheme will not accelerate the pace of social and economic
development in hitherto under-developed communities. On the other hand it will develop
a meritocracy of students in each district and impart to them an education which will in
practice make them aliens in their own milieu. They are of opinion that the model of the
new policy makers has in mind is that of the so-called public schools of England.

We should not criticise the New Education Policy for criticism’s sake. The New Education
Policy is itself an admission that there were serious gaps and shortcomings in the old
policy design and operational framework. The New Policy must then be conceived as a
response to changing social needs and anxieties relating to educating including higher
education.

The unfounded fear of the critics has been partially removed by the steady progress of
education in every level. An increasing number of children in the age-group of 6 to 11
year are joining schools. Enrolment at the primary stage (class I-V) has increased five fold
from 19.2 million at the time of independence to 101-2 million in 1990-91. The number of
children enrolled in 1992-93 was 105.37 million.

An analysis of the enrolment data has shown the population of children moving up from the
primary to secondary stage has also been increasing steadily. It is a fact that there are
certain negative tendencies which afflict all the stages of education have roots in a wider
socio-economic milieu. Only broader social and political movements can address to these
distortions and correct them. Let us hope that the New Education Policy and its implementers
begin to size up the complexities arising out of social realities around and begin to tackle
the problems in collaborative and if needed, also combative spirit.

**N.E.P. (AS REVIEWED IN 1992)**

1986

Having announced that a new policy was in development in January, 1985, the government
of Prime Minister Rajiv Gandhi introduced a new National Policy on Education in May,
1986. The new policy called for “special emphasis on the removal of disparities and to
equalise educational opportunity,” especially for Indian women, Scheduled Tribes (ST)
and the Scheduled Caste (SC) communities. To achieve these, the policy called for
expanding scholarships, adult education, recruiting more teachers from the SCs, incentives
for poor families to send their children to school regularly, development of new institutions
and providing housing and services. The NPE called for a “child-centred approach” in
primary education, and launched “Operation Blackboard” to improve primary schools
nationwide. The policy expanded the open university system with the Indira Gandhi National Open University, which had been created in 1985. The policy also called for the creation of the “rural university” model, based on the philosophy of Indian leader Mahatma Gandhi, to promote economic and social development at the grassroots level in rural India.

1992

The 1986 National Policy on Education was modified in 1992 by the P.V Narasimha Rao government. In 2005, Prime Minister Manmohan Singh adopted a new policy based on the “Common Minimum Programme” of his United Progressive Alliance (UPA) government. Programme of Action (PoA), 1992 under the National Policy on Education (NPE), 1986 envisaged conduct of a common entrance examination on all India basis for admission to professional and technical programmes in the country. For admission to Engineering and Architecture/Planning programmes, Government of India vide Resolution dated 18 October 2001 has laid down a Three - Exam Scheme (JEE and AIEEE at the National Level and the State Level Engineering Entrance Examinations (SLEE) for State Level Institutions - with an option to join AIEEE). This takes care of varying admission standards in these programmes and helps in maintenance of professional standards. This also solves problems of overlaps and reduces physical, mental and financial burden on students and their parents due to multiplicity of entrance examinations.
INTRODUCING EDUCATION
GROUP - C

CURRENT ISSUES IN INDIAN EDUCATION
In a “national system of education which provides for all children according to their capacities, it seems only logical that consideration should also be given to those children who are generally classed as ‘handicapped’. Little has been done in this country before independence to meet the specific requirements of children in this category. After independence it is now agreed that specific provision is necessary for physically challenged children who fail to keep pace with the majority of their fellow children of the same age group.

The handicapped may be divided into two major groups:

(a) The mentally handicapped,
(ii) The physically handicapped.

Mentally handicapped: types

In schools and in the world outside mental backwardness does not always mean the same thing. Among the mentally handicapped two broad types may be distinguished: (i) those who are born with intelligence below the average and (ii) those who are backward owing to some form of mal-adjustment which has cause temporary mental retardation.

Children who are mentally handicapped are not a class radically different from the normal, though the dividing line between normality seems to have been rising as civilization has advanced in complexity. Throughout the entire range of abilities that children exhibit the various grades merge almost imperceptibly into one another.

Classification

A child who appears to be dull at school may not necessarily prove a failure in life. A rigid classification is not always either possible or desirable. A detailed study of individual cases is required and efforts should be made to trace the particular causes which may be at the root of a child’s failure to make due progress at school. Among the ‘backward’ children, however, two types are generally found.

(a) Those who try, and
(b) Those who do not try.

Causes of backwardness

In the former category backwardness may due to -

(a) Lack of proper guidance in the initial stage of education.
(b) Wrong methods of instruction.
(c) Interruption of study due to frequent migration or illness.
(d) Specific disabilities which only an expert can diagnose.
(e) Nervous and temperamental factors.

Among the later the causes of backwardness may be - (a) Lack of vitality, (b) Environmental influences i.e., unsatisfactory home condition, (c) Over-indulgence or over-discipline at home, and (d) Undetected physical deficiency.

Efforts are being made today to measure the degree of backwardness by reference to a definite objective standard. ‘Intelligence Tests’ have however come to be generally regarded as reliable methods and the IQ is considered to be a fairly accurate index of the educable capacity of a child.

There are at present only a dozen institutions in India for the education of the mentally handicapped. Bodhaniketan and Children’s House are the names given to these institutions. The central and the states governments occasionally give grants to these types of institutions. They are privately managed.

**The physically challenged - classification**

The physically challenged may be divided into the following categories-

(i) Those who are deficient in one or more special senses: the blind, the deaf, and the deaf and blind, the deaf-mutes, etc.
(ii) Those who are retarded by motor deficiency including respiratory, heart and orthopedic cases.
(iii) Those who are defective in speech.

**Blindness**

Any person who is unable to do work for which eye sight is essential is classified as blind. There are several causes of blindness. In children the eyes may have been affected birth by an illness in the mother. After birth the eye may be damaged by an infecting microbe or accident. Later in life blindness may be due to certain infections, to accidents and in old people to cataract, which means that the lens, the part that lets in light has become dim with age.

For certain types of blindness there are very delicate and complicated operations which can bring back the sight, one of these is performed by removing the cornea from the eye of a dead person and grafting it on to a living eye. However, many blind people cannot be cured and it is therefore necessary to teach them to live as independently and happily as they can.

Until nearly 200 years ago it was believed that blind people could not be taught to work or to look after themselves in anyway, and many were forced to be beggars. It was not until
19th century that efforts were made to educate them. A French man named Valentin Hany devoted his life to educating the blind. First, he tried to educate a blind boy named Lesueur. He found a way to teach him to read. Before Hany’s time there had been only a few attempts to teach the blind reading, by touch. These included carving letters on blocks of wood and making letters in wood and lead so that blind people could recognize their shapes when they touched them and spell out words. However, Hany found a better way almost by accident.

One day when he was writing, the boy Lesueur came to his table and started to arrange some papers. Among them was a sheet of cardboard with heavy printing on it. As the boy’s finger passed over the dents made by the type, he showed interest in them. This gave Hany the idea of print, with raised letters that could be recognized by touch. With the help of his blind pupils he developed a method of printing in this way and published some books in the new print. He also founded the first school for the blind. Within a few years he proved that blind children could be taught to read, write, play musical instruments and do many useful things. Handy is known as the ‘father and Apostle of the Blind.’

Another kind of raised type was invented in 1847 by William Moon. He simplified the letters of the written alphabet. But it was found unsuitable for blind children.

All kinds of raised printing, however, could be read only slowly and could not be easily written, so a need was felt for a new method. One of Hany’s blind pupils Louis Braille, invented alphabet what is now known as the Braille alphabet. He worked on a system that used raised dots instead of letters. Today the Braille alphabet is taught to blind children in most of the countries.

In the Braille alphabet each letter is represented by a group of six or less raised dots arranged in an upright oblong fashion known as the Braille cell. One dot stands for A, two dots one under the other B, two dots side by side C, and so on. Six dots can be arranged to form 63 different patterns, the signs left after making the 26 letters of the alphabet are used for punctuation, numbers, musical notes and signs for short words that are frequently used. As for example, instead of writing ‘for’ as three separate patterns of dots. It is simply six dots arranged in an oblong manner.

**Example**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>O</th>
<th>P</th>
<th>Q</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
</tbody>
</table>

Example
Braille is written by making dents on paper so that raised dots appear on the other side. Braille are very large and expensive to buy.

Even Braille has not completely solved the problem of teaching the blind to read, for many blind people find it impossible to read by touch. In order that these people need not go through life ignorant of the books that have been written, many books have been read aloud from beginning to end and recorded on tape. The tapes are played on a machine known as talking book. One tape can play for about 1 hour.

In the beginning of the 20th century it has been the law in many countries that blind children must be educated. Consequently the children of these countries generally go to special schools in which they are taught the ordinary school subjects in such a way that they can understand them. For example, geography is taught by means of maps with raised outlines and natural history by means of models and stuffed animals and birds. Most blind children are taught to type using what is known as the touch typing system in which even a person with sight does not look at the keyboard. What is the total number of physically challenged children in India who require educational adjustment to make the most of their potentials?

No precise answer can be given to this question, because there has never been a nationwide survey or even a satisfactory state-wide survey of children who can be regarded as physically challenged. The number of the physically challenged according to the recent survey is 8 millions in our country.

In the absence of effective remedial measures climate customs and quacks must have added considerably to the above figure each year.

The blind

The census of 1941 put the number if blind in British Indian at 4,35,078 but census figures can hardly be relied on for educational purposes as there is no standard definition of blindness in this country. If the definition adopted by the English Board of Education be accepted, namely, ‘so blind as to be unable to perform any work for which eye-sight is essential’-expert calculation would then raise the number of the blind population in India in 1992 to about 90,00,000 with about 10,00,000 is the six to fourteen age-group.

The blind and the problems of teaching them

As in the case of deafness, blindness is not always total. It is estimated that about 60 percent of the blind population in India have enough vision to distinguish between light
and dark and to see the moving hand at a distance of one foot. Furthermore, about two-thirds of blindness in children is of pre-natal origin. This group of the blind possesses little usable visual imagery. The number of blind adults seems to be increasing because of the increase of the population and in longevity.

It is a fact that a large number of school children in India are in need of eye-care. These children create no particular educational problems if the defects are corrected. But two groups do create very definite educational problems, the partially sighted and the educationally blind.

Medical care and method of teaching

The preservation of vision is important from the standpoint of educational, social, psychological and vocational adjustments that eyes should be examined before school entrance and periodically thereafter for the discovery not only of errors of refraction and muscular defects but also of disorders developing from injuries.

The partially sighted should be taught in well-illuminated rooms free from outside or inside glare. Their books should be printed in large letters or types. Pupils with normal vision should be placed with them in the same class.

Method of teaching the blind

Really blind children should be taught the reading and writing of Braille on the Braille slate, or type writer, in Braille classes in Public Schools or in residential institutions. The Braille alphabet consists of combinations of six raised points made by a stylus, arranged in letter and number patterns in cells that can be read by the finger tips. The invention of Braille by Louise Braille in 1825 which has made the literature of the world available to the blind, represents the greatest single contribution to the education of the blind. Today Braille is not enough. It should be supplemented by long-playing records or tapes. Video system has revolutionized the teaching of the blind. The educational programme should include according to the individual needs, perceptual and motor training, literary instruction, music, fine arts and vocational preparation including professional training. It becomes a regular feature to reach the blind in prevailing schools and with normal children. The tendency is also growing of transferring pupils from the schools exclusively meant for the blind to the common schools and also of admitting the blind new comers in the regular Pre-Primary Schools. These are done with a view to affording contact with the seeing world. Important aspects of the programme are psychological adjustments of the child to the blindness and the real world and the prevention if emotional and personality mail-adjustments.

In travel and in forming conceptions, blindness is the abominable curse. It is very difficult to explain a mountain or an ocean to a blind person. These must be seen at first hand or in
pictures. Colour is also unknown to the blind. Three-dimensional models are being used now-a-days with meaningful results. For a blind person long distance travel is quite a challenge. Even for the short distance travels a blind person should be taught to keep his sense of direction all the time or quickly reorient himself if he becomes lost. However, the task of teaching a blind person to be independent of his ability to move about remains a knotty one. It can be learnt only through painful experience. A blind person must learn all these things through trial and error. He may often receive injury in making a run or crossing a busy street. But if he can do this, he will learn that he can do this he will learn important lessons.

The deaf and hard of hearing

People who are born deaf to the sound of the human voice do not learn to speak naturally as hearing people do. As a result their speech may be distorted and hard to understand. This is why they are sometimes called deaf and dumb.

Deafness may be brought about in many ways. It can be caused before birth by hereditary factors. Later, injuries, infections and continuous loud noise may also result in loss of hearing. Deafness affects different people in different ways. It may not affect the whole range of hearing equally. For example, some sounds may be heard almost normally, while others will be completely unheard.

The special education which extremely deaf children receive is designed to overcome their problems in communicating with others. Deaf children are taught to lip-read and to speak by carefully watching and imitating the teachers’ speech. Powerful electrical hearing aids are used to make the best of what hearing remains. Children with a less serious hearing-loss can often be taught in normal schools, where they receive extra help.

Generally deaf children are born with normal intelligence but they have great difficulties in communicating their desires and thinking. Naturally they become backward in their educational journey. Despite great advances in the teaching methods and equipment used with deaf children, not all learn to speak and lip read well and many come to rely on finger spelling and signs to communicate with others. These signs are usually learnt from other deaf people. Finger spelling is a matter of placing the hands and fingers in different positions for each of the letters of the alphabet, and signs are complete movements standing for different words or phrases. Much practice is needed to talk with deaf people who use signs, but most of them can communicate by means of simple written messages.

When talking to a deaf person who relies on lip-readings it is important to keep facing him when you are speaking. We have to speak clearly and steadily, otherwise much of what we say will be of no use.
What is to be done for the deaf and hard of hearing educationally

To live in society with other people requires communication. The two-way interchange can be effective only if both parties understand each other. Since language is learned by the process of imitating sounds heard, it follows that the most crucial problem of the deaf is their language limitation. To teach language skills to child, on with deafness requires well-trained teachers. Unless special classes with good equipment and well-trained teachers are available in the public school those children should be enrolled at the age of three or four in special schools for the deaf, age of three or four in special schools for the deaf. Programmes and curricula needed to teach language to deaf children are so highly specialized that a regular classroom teacher cannot make these adjustments. Special techniques in a special environment are needed. However, when a deaf child has learnt language skills to a point where he can communicate with people with normal hearing, he may then be placed in a class appropriate to his achievement in the general school with normal children.

For hard of hearing children some adjustments can be made. First they should be provided with hearing-aids and must be taught to learn 10 use the hearing aid. When this has been done, they should be placed in the regular class-room. The teacher then has the job of letting the child sit where he can both see that his hearing aid is kept in good order, and he wears it and that he understands his lessons. These are general procedures.

Education of the blind in India

During the British period no conscious effort on the part of the government was made to tackle this problem. The government was blind, so to say, towards the blind. Only some voluntary philanthropic organizations were in the field. There were about 33 associations which were gallantly facing this enormous challenge; of these 25 were for the blind only, 6 were for both blind and deaf. One was in combination with a poor asylum, and one with a cripple home. Altogether they had a total enrolment of 1,156 blind pupils of whom 998 were males and 158 females. Of these 987 were children. It will be clear from this how much remained to be done.

Present position of the education of the physically challenged - New outlook

If this problem is to be effectively tackled, the services provided must be comprehensive. It is true that in other countries blind welfare work has been pioneered by voluntary organizations and the state has come in when private enterprise had already made appreciable progress. India had waited long enough and the time arrived when she achieved independence. Naturally our national government has taken up the education of the handicapped children as a necessary part of the general scheme, though it welcomes and encourages voluntary assistance.
**State initiative**

Our national government has realized that the education of the physically challenged has to be organized not merely on humanitarian grounds but also on grounds of utility. Proper education generally enables a handicapped child to overcome largely his or her handicap and makes him or her into a useful citizen. Social justice also demands it; it has to be remembered that the Constitutional Directive on compulsory education includes handicapped children as well. Even after independence very little has been done in this field so far; and on account of several difficulties any great achievement in the field of education of the physically handicapped does not seem to be possible in the near future. All the same, it is important that a serious beginning is made immediately.

**Aims and objectives**

The primary task of education for a physically challenged child is to prepare him for adjustment to a socio-cultural environment designed to meet the needs of the normal. It is essential, therefore, that the education of handicapped children should be an inseparable part of the general education system. The differences lie in the methods employed to teach the child uses to acquire information. These differences in methodology do not influence the content of the goals of education. This type of education may be called ‘special education.’

**Existing educational facilities**

In India the present position of educational facilities for these children is as follows-

**The blind**

At present there are about 120 schools and other establishments for the blind, with an enrolment of 5,000 only. It is just 5 percent of the total number of blind children in the country. Most of these institutions impart primary education coupled with training in a few simple handicrafts. Music forms an integral part of the curriculum. The most of the institutions are run by voluntary agencies but are assisted by the central and state governments. Moreover, the central government has set up a comprehensive national centre for the blind at Dehradun. This centre includes a central Braille Press which publishes text books and other reading materials in Braille. The centre also has a workshop for the manufacture of Braille appliances which produces the basic equipment needed for the education of the blind. There are three centres for the training of teachers of the blind sponsored by the government of India and they can train between 30 and 40 teachers annually.

**The deaf and dumb**

The number of schools for deaf and dumb children is about 70. Most of these schools provide primary education coupled with some pre-vocational training in technical and non-technical occupations. The majority are privately managed but are aided by the state governments. The total enrolment is 4,000 of such children. About half a dozen centres for the training of teachers of the deaf and dumb are functioning at present.
The Orthopaedically handicapped

The major problem of this category of children is locomotor in character and they often attend ordinary schools. At present there are about one thousand. Since this type of children do not present special educational problems, it is not considered necessary to have specially trained teacher for this category of children.

It is evident from the above description that the existing facilities are extremely inadequate. The importance of carefully thought out plans for the development of educational services for the handicapped cannot, therefore, be over-emphasised.

What should be done

The progress in providing educational facilities to physically and mentally handicapped children is limited by two main considerations; teachers and financial resources. A reasonable target will, therefore, be to provide in the near future education for about 20 percent of the blind, deaf and orthopaedically handicapped children. As a part of the programme, it should be possible to have at least one good institution for the education of handicapped children in each district.

Obligation of the government

The state should take up the education of the handicapped children as a necessary part of the general scheme of education. The state should enact a comprehensive legislation in the general interest of the handicapped children. Such legislation should ensure among other measures—the compulsory free education of handicapped children as well as facilities for vocational training to provide employment for the employable blind, and financial help of those who cannot be made self-supporting. As a preliminary to launching an effective schemes for the welfare of the blind, it is essential that a special census of the blind persons in India should be taken soon as possible, It is also necessary to adopt a uniform Braille code for Indian language as a whole.

Apart from training facilities for the blind, there also should be in every area an after-care department to place those trained in jobs, as well as a research bureau to investigate improved methods of training and new avenues of employment. Special training institutions will also be necessary for training teachers for the blind schools. While the schools with their medical services will do all they can to train and place the blind in life, there are numerous other aspects of this problem, e.g. the prevention of blindness, the education of public opinion, begging etc., which can only be tackled effectively by an all-India society with the sanction of the government behind it.

It is common practice in existing institutions to combine the education of the deaf, deafmutes and other physically deformatives with that of the blind. As their requirements are
INTRODUCING EDUCATION

separate and distinct, there should be special institutions for education of each main category. Deaf-mutes and the stone-deaf require education in a special school for the deaf; the partially deaf may be taught in an ordinary school.

The training of teachers will need emphasis and attention. Assuming a pupil-teacher ratio of 10:1 about 25000 teachers will be needed for the blind, deaf and cripple children. This will necessitate a considerable increase in the capacity of the existing training institutions and establishment of new ones. It is also necessary to co-ordinate the efforts of different agencies working in the field such as the Ministry of Education, the Central Social Welfare Board, voluntary organizations interested in the problem and the Ministry of Health. Similar co-ordination will also be needed at the state levels.

It is also necessary to develop adequate research in the problem. The Ministry of Education should develop a programme for this and allocate the necessary funds. The NCERT should have a cell for the study of handicapped children. The duty of this cell would be to keep in touch with the research that is being done in our country and outside and to prepare materials for the use of the teachers.

In considering the question of accommodation, we may say that although the average number in a class in the special school for handicapped children be considerably smaller as a rule than in an ordinary school. It should not be regarded as an adequate reason for reducing the size (400 sq. ft.) Special schools will, on the whole, be more costly than these ordinary schools and the cost of each type of school will vary with the nature of the special services and requirements involved. It may be said that being a poor country, India is not in a position to afford the money for such special schools the return for which may not be worth mentioning. The answer is that in a national system intended to satisfy the needs of all; it is difficult to ignore the claims of those who are unfortunate through no fault of their own. Moreover, the money spent in educating them may prove a profitable investment in view of the fact that many of the handicapped at the end of their training may be saved from becoming a burden either on private charity or on the state.

The education of the handicapped should not be neglected any more. The state government is not so much keen on this matter. School education being a state subject, it is important to assess the attitude. Most of them think that whatever funds are available should be spent in extending education among normal children. In spite of this, it is to be borne in mind that the provision of special schools for physically handicapped children should be one of the functions of the state and that the question should receive the earnest and immediate attention of the educational authorities concerned. The time has come when state action can no longer be delayed. While in a period of financial stringency there may
have been some justification for preferring the claims of the normal, there can be no excuse for neglecting the needs of the handicapped in a national system of education. The National Policy on Education, 1986, states that the objective regard to handicapped should be to integrate the physically and mentally handicapped with the general community as equal partners, to prepare them for normal growth and to enable them to face life with courage and confidence.

The following measures will be taken in this regard:

Wherever it is feasible, the education of children with motor handicaps and other mild handicaps will be common with that of others.

Special schools with hostels will be provided, as far as possible at district headquarters, for the severely handicapped children.

Adequate arrangements will be made for the vocational training of the disabled.

Teacher’s training programmes will be reoriented, in particular for teachers of primary classes, to deal with the special difficulties of the handicapped children.

Voluntary effort for the education of the disabled, will be encouraged in every possible manner.
UNIVERSALISATION OF PRIMARY EDUCATION (U.P.E.)

Universalisation of Elementary Education (UEE) has been accepted as a national goal in India since Independence. The founding fathers of our Constitution recognised UEE as a crucial input for nation building. The Directive Principles of State Policy envisage that the state shall endeavour to provide free and compulsory education for children up to 14 years of age within a period of 10 years. The National Education Policies so far have reiterated the constitutional directive. The National Policy on Education 1986 (as envisaged in 1992) resolves to provide free and compulsory education of satisfactory quality to all children up to 14 years of age before the commencement of the twenty first century.

The colonial regime prior to our Independence in 1947 established a system of education that had limited access and denied mass education. It laid greater emphasis on conformism to socio-political and economic systems prevailing in the country in those times. Macaulay explicitly stated that the objective of the education system was to create a new breed of Indians as similar to Europeans as possible. It was on account of this that the Indian National Movement developed a strong critique of the British System that only imparted learning skills and not life skills and that did not respect Indian traditions. The national movement also expressed the global sentiment of education for all and Gopal Krishna Gokhale’s Compulsory Education Bill reflected the spirit of Indias freedom movement.

Fresh Approach

The fervour for freedom and patriotism to achieve “swawalamban,” made our leaders search for an alternative approach to elementary education. Article 41 and 45 of the Constitution enunciating the Directive Principles of State Policy on education, provided the basis for the new approach. 14 States and four Union Territories enacted Legislation for free and compulsory primary education. All States have exempted children from tuition fee up to upper primary classes. However, compulsion has not been enforced due to socio-economic and political considerations.

The thrust of the Central and State Governments in universalising elementary education so far has been on three aspects, namely- universal access, universal retention and universal achievement. Concerted efforts made in these areas have resulted in significant expansion of elementary education in the country. The number of primary schools has increased from 2.10 lakh in 1950-51 to 5.90 lakh and number of upper primary schools from 13,000 to 1.71 lakh in 1995-96.
During this period, Gross Enrolment Ratio (GER) at primary levels has increased from 43 per cent in 1950-51 to 104 per cent in 1995-96. 95 per cent of the rural population in the country has a primary school within one kilometre and 85 per cent an upper primary school within a distance of three kilometres. With 15 crore children and 30 lakh teachers, we have one of the largest elementary education systems in the world. The proportion of girls in classes I-VIII as also women teachers has increased steadily.

**Policy and Planning**

The period after Independence saw a linear expansion of the elementary education system through allocation of additional resources. The first National Policy on Education, 1968 recommended free and compulsory elementary education and equalisation of educational opportunities especially for girls and children belonging to SCs and STs. The National Policy on Education 1986 and its Programme of Action, (1992) was enunciated on the basis of a detailed review of the country’s educational performance. The policy resolves to achieve UEE by 2000 A.D.

The plan allocations for elementary education have increased steadily, though still not adequate to fulfil the constitutional commitments. Fifty years of freedom have seen higher levels of spending by the Central and State Governments to provide quality education for all. Better school infrastructure, more and better-paid school teachers, timely availability of subsidised or free text books in regional languages, provision of scholarships, uniforms and mid day meals have all received attention of State governments who are the main providers of elementary education.

**External Assistance**

Following the World Conference for Education for all (EFA) in Jomtien (Thailand) in March 1990 there is a greater commitment and willingness on the part of multilateral and bilateral aid agencies to invest in primary education in developing countries. A major internationally assisted programme namely District Primary Education Programme (DPEP) was launched in 1992 with assistance from World Bank and European Union. The programme adopts a holistic approach to promote primary education through decentralized planning and integrated programming at district level. The programme has been extended to 149 districts in 14 States in 1997. The Lok Jumbish (LJP) and Shiksha Karmi Projects (SKP) are two other successful internationally assisted projects. Lok Jumbish, meaning a peoples movement for UEE, has a holistic understanding about the problem of UEE and is implemented by establishing an interface between the local community, the teaching profession, the educational administration and the learners. The Shiksha Karmi Project envisages a paradigm shift in delivery of primary education. Inspired by the concept of barefoot teachers, the project has effectively responded to the problem of teacher absenteeism in the remote and inaccessible areas of Rajasthan.
**Community Mobilisation**

The process of decentralisation has been an encouraging feature of our efforts to universalise elementary education. NPE, 1986 visualises direct community involvement in the form of Village Education Committees for management of elementary education. The POA, 1992 emphasised micro-planning as a process of designing a family-wise and child-wise plan of education by which every child regularly attends a school or a Non Formal Education (NFE) centre, continues his or her education at a place suitable to him/her and completes at least eight years of schooling or its equivalent at the NFE centre.

The Seventy-third and Seventy-fourth Constitutional Amendments have created greater avenues for the Panchayati Raj Institutions to play a more dynamic role in mobilising the communities to take responsibility to ensure quality education for every child. Genuine community involvement is the key factor for the successes of LJP and SKP in Rajasthan. LJP has had a positive effect on the empowerment of locally elected people, especially women at village level who are often active members of the LJ core teams and Mahila Samoohs. The VECs, carefully formed and trained through environmental building activities in the LJ, are actively involved in school matters. SKP has constituted VECs in 2000 villages. An important role of the VEC is to mobilise resources for maintenance, repair and construction of school buildings. The VECs also help in determining the school calendar and school timings in consultation with the local community.

**NGOs As Partners**

NGOs are emerging as important partners in efforts of the Governments towards UEE. The participation of NGOs together with community support has helped to improve the physical conditions and environment of elementary schools as well as promotion of education for girls and children belonging to SCs and STs and working children. As of now, nearly 750 NGOs are supplementing the Governmental efforts towards UEE by rendering cooperation and resource support to non-formal education with assistance from the Government.

**Future Challenges**

The country has undoubtedly been successful in evolving a national structure for elementary education in the last fifty years. Primary education is now provided in the mother tongue or regional language in all the States and UTs. There has been substantial increase in access to elementary education. First generation learners, girls and the underprivileged sections of society have been provided with unique opportunities for vertical mobility. Literacy standards have been substantially improved across the country.

Despite substantial achievements, the task of UEE is far from complete. Schools and enrolments have certainly increased but so has the number of out of school children. The country today has one of the largest illiterate population in the world. Caste, gender, class
and regional disparities in UEE though reduced, are still glaring and persistent. While the demand for quality education is showing perceptible increase because of improved awareness and social mobilisation through organised efforts, supply is generally inadequate. The educational administration in most States and UTs is yet to effectively tackle endemic problems concerning shortage of teachers, inadequate and improperly designed school buildings, lack of teaching/learning equipment, need based teacher training and a curriculum related to real life requirements.

The recent measures initiated by the Government, namely DPEP, Mid-day Meal Programme and the proposal for National Elementary Education Mission (NEEM), the National Programme Media advocacy and publicity for UEE and the Joint GOI-UN System Education Programme are expected to address some of these challenges more effectively. The proposed National Elementary Education Mission should evolve strategies for reaching the un-reached and achieving the goal of UEE within a given time frame in a systematic, sustained and integrated manner. The resolve of the Government to make elementary education, a fundamental right of all children of 6-14 years, is expected to spur the government and non-government sectors to take necessary measures to achieve UEE. Efforts of the Government to mobilise resources for education to the extent of 6 per cent of GDP will also help in hastening the process of universalising elementary education.

It is hoped that with a clear vision, firm will, higher investments, greater dedication, and increased people’s participation, we would be able to fulfil our goal of providing satisfactory quality of education to all children in the country within the next decade.
GROUP - D

EDUCATION FOR THE 21ST, CENTURY
The significance of the Delors report in the context of UNESCO’s activities over the past 30 years

The Delors report has designed a comprehensive framework in which essential and productive debate and reflection on the long term purposes, organisation and outcomes of learning can take place.

It is a seminal and very ambitious document, wider in scope than anything UNESCO has attempted since the late 1960s. It attempts to identify both the ‘state of play’ and desirable future directions for education across all sectors around the world. While its messages are particularly urgent for developing countries, the report draws developed countries into UNESCO’s common purpose of establishing a united, equitable and sustainable world.

The report is much wider in scope than its other major initiative in the decade, the Education for all program launched in 1990.

For those of you who may be unfamiliar with the origins of the report, the UNESCO General Conference officially established the International Commission on Education for the 21st Century in 1993.

The Commission was funded by UNESCO, but functioned independently. It consisted of fifteen eminent people from around the world from a variety of cultural and professional backgrounds. It was chaired by Jacques Delors, President of the European Commission from 1985-95, and a former French Minister of Economy and Finance.

The Commission spent three years in consulting extensively on a world-wide basis.

The main challenge facing the Commission was the enormous diversity of educational situations, conceptions and structures around the world, plus the huge volume of research material available.

In the words of the Commission’s report, ‘it was thus obliged to be selective and to single out what was essential for the future, bearing in mind both geopolitical, economic, social and cultural trends on the one hand and, on the other, the part educational policies could play’ (Learning : the Treasure Within, UNESCO, 1996, p. 249).

The result of the Commission’s three years of work was its report titled. Learning: the Treasure Within, presented to UNESCO in 1996, known as the Delors report.
The report enunciates three directions for effort in educational renewal and reform:

- a holistic approach to education reform, encompassing all the sectors from basic education to university study;
- re-defining roles and professional requirements of teachers; and
- the need for international cooperation with the concept of educating for a global society.

Within this context, it identified four ‘pillars’ as the foundations of education that emphasise the concept of learning throughout life:

**Learning to Know** – which focuses on combining sufficiently broad general knowledge and basic education, with the opportunity to work in-depth on a small number of subjects, in the light of rapid changes brought about by scientific progress and new forms of economic and social activity. This also includes learning how to learn, so as to benefit from ongoing educational opportunities arising throughout life.

**Learning to Do** – which emphasises the learning of skills necessary to practice a profession or trade, including all schemes in which education and training interact with work. People also need to develop the ability to face a variety of situations, often unforeseeable, and to work in a team approach. Partnerships between education, business and industry are encouraged.

**Learning to Live Together** – which argues that in the current context of globalisation, people must come to understand others, their history, traditions and cultures, through living and interacting peacefully together.

**Learning to Be** – which emphasises the development of human potential to the fullest. As we enter the 21st century, everyone will need to exercise greater independence and judgment, combined with a stronger sense of personal responsibility.

The report is not a blueprint for reform but rather the ‘principal instrument for dialogue concerning the role of education and the need for educational reform into the 21st century’.

It argues that the impact of globalisation and its interrelationship with the explosion in information technologies and communication, together with increasing disparity between nations and populations, calls for this dialogue to be held across national borders. It also reminds us that the fundamental right to education is not yet a reality for many people.

While UNESCO remains committed to promulgating the deliberations and recommendations of the report, it is the responsibility of regions and individual nations and states to consider the report and to adapt its recommendations to the state, national and regional context. This is beginning to happen.
ROLE OF TECHNOLOGY IN EDUCATION

What is Educational Technology?

Technology refers to the techniques as also the technical contrivances. A systematic way of applying the techniques to achieve an objective is as important as the use of technical equipment for the same. As a matter of fact, techniques are reckoned as the software and the equipment as the hardware of technology. Technology results in new designs and devices as also new set of procedures and techniques. For example, the development of telephone has led to phone books, answering machines, Fax, telephone shopping, etc. The ‘hard’ component (physical device) may be differentiated from the ‘soft’ component (methodologies) for the purpose of study.

Education, the act or process of acquiring and imparting knowledge, is crucial to the development of a learner with a view to his/her participation in the transformation of the world for a better tomorrow. Learning and understanding are basic to the definition of education.

Education technology is not a simple combination of these two words as shown in Fig. 1.1. It is usually thought of even more than the sum of the following two interpretations:

1. Technology in education
2. Technology of education

![Fig 1.1. Concept of Educational Technology](image)

Early developments referred to the role of technology in education which signify the use of audiovisual equipment, i.e., hardware in educational processes. Later developments recognize the concept of technology of education, i.e., techniques and methodologies of the teaching-learning process. This is indeed the software aspect of educational technology. The origin of software is closely associated with the courseware, i.e., instructional design and development of a subject.
Use of technology in education results in increased effectiveness of the educational process. Use of technology in training results in increased productivity through enhanced human capability. For example, telephone extends our capability to travel large distance over short period of time. Overhead projectors extend our capabilities to project a large image of a visual on a screen and slides enable us to capture real-life events and bring them into the classroom.

Audiovisuals have been on the move for quite sometime now. They have made an impact in many different situations, e.g., seminars, conferences, extension lectures, meetings, research and project report presentations. Classrooms are also beginning to feel their influence!

Some of the recognised and oft-quoted definitions of educational technology given are as follows:

**Commission on Instructional Technology, USA**

“Educational Technology is a systematic way of designing, implementing and evaluating the total process of learning and teaching in terms of specific objectives, based on research of human learning and communication and employing a combination of human and non-human resources to bring about more effective instruction.”

**Association for Educational Communications and Technology, USA**

“Educational Technology is a complex, integrated process involving people, procedures, ideas, devices, and organization, for analyzing problems and devising, implementing, evaluating, and managing solutions to those problems, involved in all aspects of learning.”

**Council for Educational Technology, UK**

“Educational Technology is the development, application and evaluation of systems, techniques and aids to improve the process of human learning.”

**National Centre for Programmed Learning, UK**

“Educational Technology is the application of scientific knowledge about learning, and the conditions of learning, to improve the effectiveness and efficiency of teaching and training. In the absence of scientifically established principles, educational technology implements techniques of empirical testing to improve learning situations.”

A close look at the definitions reveals that they underline educational technology as a systematic way, a process or an application of the scientific knowledge, to improve the efficiency of the process of learning and instruction. It is thus considered to be the technology of education more than the technology in education.
Development of Educational Technology

The subject of educational technology has developed over three aspects after the Second World War:

*Mass Communication*
*Individual Learning* and
*Group Learning Strategies.*

According to Elton, each of these aspects has passed through the following three phases:

Research (R)
Development (D) and
Use (U)

This is shown schematically in Fig. 1.2.

Mass communication or mass instruction was the first one to be taken up around 1940. Research and development led to the use of radio, television broadcast and closed circuit television (CCTV) for mass instruction. It was believed that more people could be educated faster and better without multiplying the number of teachers, classrooms and associated resources. Closed circuit television systems were installed for large classes and for subjects which were taught repetitively.
The practice was not favoured by many as it lacked feedback and interactivity. Most programmes were crudely produced, presented and employed. The practice was, therefore, discontinued. Radio and television broadcast techniques have, however, survived.

Individualised learning became the focus of many researches in the fifties. Coupled with Skinner’s behavioural psychology, it led to the development of individualized learning packages. Skinner proposed that learning take place through a cycle of stimulus, response and reinforcement. It resulted in linear programming and later, in branched programme learning. Attempts to design programmed instruction texts and teaching machines signaled the inadequacy of the simplistic models of learning. A revival of individualized learning has taken place with the advent of computers in education.

The group learning aspect of educational technology began to be favoured in view of its potential to develop group skills such as discussion and interpersonal skills. Research on group learning came about with the humanistic psychology due to Rogers. The technique of group dynamics.

![Instructional Systems Development Diagram](image)

Fig. 1.3 Instructional Systems Development

Refers to the interactive process of learning from one another in small group situations. Simulation, role-play, games and case studies are some of the group learning techniques. The hard-ware and software required for group learning are only those which help in simulation, presentation of case studies, games, etc.
**Instructional Design and Technology**

Instructional design refers to the strategic design and development of instruction for the desired objectives. It incorporates the theories of learning, principles of communication and hypotheses for interest, motivation and participation of learners. Instructional technology implies the techniques and methodologies of instruction, i.e., technology of instruction. It does not place any emphasis on audiovisual aids *per se*. Instructional design and technology are, therefore, linked with the effectiveness and efficiency of the teaching-learning process.

The stages of instructional systems development are shown schematically in Fig. 1.5. It shows that an instructional system is developed by analyzing the needs of learners, designing the curriculum, developing the lessons and media, implementation of instruction and finally evaluating the progress of the students as also their terminal abilities.

**Educational Technology vs Audiovisual Aids**

There is often a confusion in the minds of the beginners about the terms. Educational Technology is a vast subject concerned with the application of scientific knowledge about learning and conditions of learning in order to improve the effectiveness of teaching, learning and evaluation. Audiovisuals are merely the aids or resources, i.e., materials which are employed to improve the quality of the message. Audio-visuals are a part of a subject of Educational Technology as shown in Fig 1.4. A detailed comparison between audiovisual aids and educational technology is shown in Table 1.1.

---

**Table 1.1: Educational Technology vs Audiovisual Aids**

<table>
<thead>
<tr>
<th>Audiovisual Aids</th>
<th>Educational Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audiovisual aids are physical objects.</td>
<td>Educational technology is a vast subject.</td>
</tr>
<tr>
<td>Audiovisuals consist of print matter</td>
<td>The subject of educational technology encompasses learning</td>
</tr>
<tr>
<td>projected and electronics resources</td>
<td>psychology, communication and advances in science and</td>
</tr>
<tr>
<td>such as slides, Video and computers.</td>
<td>technology.</td>
</tr>
</tbody>
</table>

---

*Fig 1.4 Audiovisual Aids as a Subset of Educational Technology*
INTRODUCING EDUCATION

Audiovisuals are material products which may be used or misused. Educational technology connotes processes and products of instructional design.

Audiovisuals improve the quality of the message they impart audio and visual dimensions to it. Educational technology aims at improving all aspects of communication, i.e. encoding, channel, Barriers, decoding, retention and application.

Audiovisual aids exist without regard to group dynamics and individual differences. Educational technology deals with the processes of implementing methods and resources with regard to group dynamics and individual differences.

Audiovisuals are products of technology alone. They are technical gadgets. Educational technology is a great deal more than Technology; it is based on psychology, social Anthropology, etc.

Audiovisuals stand alone. These are unrelated articles. Educational technology is a system with a number of Interconnected and interdependent components.

Audiovisual aids are different for different topics and subjects. They fit in a curriculum. Educational technology principles are applicable to all topics and subjects and hence basic to all curriculum development.

Audiovisual Resources : Media

An aural message is perhaps the minimum required for communication. It is often necessary to supplement the aural message with a visual in order to convey it effectively. Visuals with or without aural components are called audiovisual resources, aids, media or simply audiovisuals. Audiovisuals resources consist of hardware and software components. In fact, for every hardware, there is a corresponding software as shown in Table 1.2.

Table 1.2 : Educational Hardware and Corresponding Software

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chalkboard</td>
<td>Chalkwork</td>
</tr>
<tr>
<td>Overhead projector</td>
<td>Overhead transparencies</td>
</tr>
<tr>
<td>Slide projector</td>
<td>Slides</td>
</tr>
<tr>
<td>VCR and Monitor</td>
<td>Video programme</td>
</tr>
<tr>
<td>Computer</td>
<td>Computer programme</td>
</tr>
<tr>
<td>Blank paper</td>
<td>Written matter</td>
</tr>
<tr>
<td>Audio-recorder</td>
<td>Recorded audio</td>
</tr>
</tbody>
</table>
The audio component may be added to any one of the above resources. It may either be with recorded voice on cassettes, tapes and discs or it may be live oral message by the presenter. Sometimes, the audio through a recorder or radio broadcast may be the only channel for the message.

In view of the wide range of audiovisuals, they are best classified as non-projected, projected and electronic resources as shown in Fig. 1.5.

Audiovisual software is prepared through the steps of preparing instructional design, development and associated processes, e.g., writing, printing and recording. Even so, some early developments denounced all audiovisuals as technology in education and thus narrowed down the scope of educational technology to the mechanical use of audiovisual components. This view is no longer tenable since the basis of audiovisual education goes deep into the psychology of learning and effective communication.

Audiovisual communication in the context of education is different from the media for mass communication. Mass media may, however, overlap with audiovisuals for communication. Use of radio, telephone and television in broadcast, cable or closed-circuit modes may well be educationally meaningful if the message is identified through instructional design and development processes. Furthermore, it is the effective use of the audio or video programme that makes it educationally powerful. Techniques such as previewing the programme, preparing the audience to look for the intended information in advance of the programme and following up the sessions with further questions and discussions, etc. are very useful activities.
Educational Technology as a System

A ‘System’ is an assemblage of interconnected and interacting components. All the components which comprise the system are conceptualized to be bounded by an imaginary boundary for the purpose of identifying the system. The ‘region’ outside the system boundary represents the conditions under which the system operates; it is referred to as the environment for the system as shown in Fig. 1.6.

One may choose to include any number and size of components to constitute a system for a desired purpose. For example, the entire universe with all the creations of God, Man and the Devil may be considered as a system; a biological cell, a television, a TV tube, an institute, an industry are some further examples of systems. A system may consist of subsystems, which when combined constitute the system.

Systems are classified as closed systems and open systems. When a system operates in isolation from the environment, i.e., without any effect or transaction from the environment it is said to be a closed system. On the other hand if a system interacts with the environment by way of some input and output, it is called an open system. The input may consist of raw material information, energy or human beings and the output may be finished products or qualified persons. The purpose of an open system may be to convert the given input into the desired output. In that case, the system is indeed a transformation function, which is either a process or a series of processes. An industry, an institute, and a car engine are examples of open systems.

In terms of systems approach, educational technology may be viewed as

![Diagram](image-url)
A system with a number of subsystems and components or elements as shown in Fig. 1.8.

Dealing with the interacting subsystems or components of the educational technology system is referred to as the systems approach in dealing with institutional problems and developmental issues. It brings into focus the process and the product orientation of educational technology. The process concept directs our attention to the components of needs assessment, goal analysis, task analysis, curriculum design, selection of instructional delivery systems production and utilization of media as also the formative and summative evaluation. The product orientation of educational technology makes reference to the audiovisual devices and hardware. The total system consists of interacting processes and products employed for the desired educational goals. The systems approach helps us to identify the effectiveness and the weak points of subsystems and hence the means through which instructional systems can operate at optimum efficiencies. It is desirable to learn in detail about the subsystems and components of educational technology system before taking up optimization of the whole system.

Systems have some general characteristics;

- A system refers to a collective entity consisting of a group of inter-related and interacting elements.
- A system is a relative concept; it can be a subsystem of a larger system!
- A system may be closed or open-ended..
- All systems are directed to achieve certain goals and outputs under some constraints and with given inputs.
- All systems may be optimized by way of considering the variables alternatives, feedback processes, etc.

A simple systems model of the teaching-learning process is shown in Fig 1.9. It shows the input, the system and the output. A more detailed system of the teaching-learning-evaluation process of instruction is shown in Fig. 1.10. Inputs to the system are the entry-profile of the student, audiovisual and other resources; the system results in improved exit-profile of students. It also shows the interaction of elements and the iterative nature of the teaching-learning-evaluation process. The starting point is the learning objectives from which content is derived. A teaching-learning strategy is identified as also appropriate audiovisual material and other resources are taken in. Learning thus created in students is evaluated. It the learning is short of the objective, the strategy and learning process are reviewed. If the objective is achieved, the next objective is taken up and so on. It may be observed that the objectives play a multiple role in the total process. Content, i.e, subject matter is determined from the objectives;
Teaching methods and audiovisual resources are identified in view of the intended objectives and finally, the learning outcome of students is measured against the same terminal objectives.

System concept of educational technology permits us to optimize the effectiveness of whatever it is applied to Educational technology improves the teaching-learning process in a classroom by way of the following:

- by reducing the time for learning the same thing and increasing the learning outcome over the same time,
- by lowering the percentage dropout and increasing student achievement,
- by decreasing student frustration and by increasing teacher satisfaction.

Effectiveness of an educational process is not improved merely by the introduction of technology into it. It is, in fact, a function of human skills of employing the technology as also the hardware and software components of technology

\[ \text{Effectiveness} = f(\text{Human skills, software, hardware}) \]

The role of a teacher is characterized by the following four broad functions:

**Planning**: establishment of the objectives, preparation of units and schedule of training, etc.

**Organising**: arrangement of the learning resources, utilization of audiovisuals, etc.

**Leading**: motivation, encouragement and provision of stimuli to the students in the teaching-learning process.

**Controlling**: assessment, feedback and regulation so as to realize the objectives optimally.

These four inter-related functions of a teacher constitute the Teacher as a system as shown in Fig. 1.10.
Management for Learning

With the ever-increasing availability of audiovisual resources and greater knowledge of the learning process, the primary role of a teacher is to be a Resource Person and manager of resources.

Conventional libraries of books and journals are being converted into Learning Resource Centres where a complete range of software is available. Videocassette, slide series, tape-slide programmes, computer software and overhead transparencies are being added and cross-referred to learning resource centre. With greater emphasis on the development or Resources with the participation of teachers likely to use these resources, Resource Centres are being set up where groups of teachers take up joint projects of audiovisual resource development. Likewise, they take up the production of modules on different topics. Modular format of instruction has created new interest from the point of view of self-instruction and individualized instruction.

A learning resource centre may well be equipped with a number of viewing and work-tables for interactive use of computer software. VCRs, monitors and headphones are installed for the former and computer terminals or personal computers for the latter as shown.

More and more libraries are being networked for providing access to books and journals as also bibliographies of research on different topics. This is made possible through computer and video technologies.
Research has let us to believe that learning is individual to a learner. The teacher-centered approach of teaching is, therefore, being transformed into learner-centered methods of learning.

It is thought that courses on Study Skills and Techniques of Learning may be given to students early in their adolescence so that they should take over the responsibility of learning and employ efficient methods of learning in classrooms, reading books and using other software as also from the world of work. Teaching students to learn for themselves and enabling them to learn how to study effectively is perhaps the latest development in educational technology.
References

1. *Modern Education - Its Aims and Principles* by J.C. Chakravarti
2. *Philosophy and Principles of Education* by Archana Banerjee
3. *Elements of Educational Psychology* by H. R. Bhatia
4. *Advanced Educational Psychology* by S. S. Chauhan
5. *Education in India - Past, Present and Future* by J. R. Banerjee
6. *Principles and Practices of Education* by Dr. B. R. Purkait
7. *Aspects of Child Life and Education* by Granville Stanley Hall
8. *Educational Psychology* by Anita Woolfolk Hoy, Anita E. Woolfolk
9. *Experience and Education* by John Dewey
10. *The Quality of School Teacher* by William Glasser
11. *Educational technology* by K. L. Kumar
12. *Modern introduction to Education* by Dr. Dibakar Kundu
13. *Higher Secondary Education* by K. N. Mallick
14. *Internet References on the Topics*