

Unit 1

INTELLIGENCE AND APTITUDE

After studying this chapter you will:

- *Understand the meaning of intelligence*
- *Learn how to measure intelligence*
- *Comprehend the theories of intelligence*
- *Know the importance of emotional intelligence*

Chapter outline

Introduction

Intelligence is word frequently used in routine language. It is generally used for speedy learning, memory, logical thinking etc. In psychology discipline intelligence is having a specific meaning. It is individual difference among people. By understanding the intelligence it can be determined that how a person adopt his behaviours according to the environment.

Definition and Nature

A number of psychologists have tried to define intelligence. **Boring (1923)** defined intelligence as "*Intelligence is what is measured by intelligence tests*". But this definition does not give any direction to particular meaning. Later several psychologists tried to define intelligence

in different manner. All the definitions can be segregated in three parts.

- First type of definitions suggests those definitions which explore the relationships of adjustment and environment. It postulates that how quickly a person he/she can adjust with the environment will be considered as the level of intelligence.
- Second type of definition suggests that intelligence is ability of learning. It explains that if a person has high ability of learning he will be considered as of high intelligence.
- Third type of definitions suggests that intelligence is ability of abstract reasoning. It explains that if a person has high ability of abstract reasoning he/she will be considered of high intelligent.

Later on, psychologists found a common defect in all the three types of definition that in particular type, one ability is highlighted instead of considering all abilities. In fact, it is a group of abilities. The definitions' considering that

intelligence is a group of abilities are given below:

According to **Wechsler (1939)**, *“Intelligence is the aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment.”*

According to **Robinson and Robinson (1965)**, *“Intelligence refers to the whole class of cognitive behaviours which reflect an individual’s capacity to solve problems with insight, to adapt himself to new situations, to think abstractly and to profit from his experiences.”*

According to **Neisser et. al., (1996)**, *“Intelligence is the individual ability to understand complex ideas, to adapt effectively to the environment, to adapt effectively to the environment, to learn from experience, to engage in various forms of reasoning and to overcome obstacles by taking thought.”*

The above definitions highlights that intelligence is a group of the abilities as per the above definitions the nature of intelligence is as follows:

- Intelligence is an aggregate of abilities.
- Person takes help of insight on the basis of intelligence for problem solving and due to intelligence he takes help of previous experiences for solving any problem.
- On the basis of intelligence person act purposefully. If a person act significantly he/she will be considered intelligent and if a person act aimless he/she will be not considered as intelligent.

- Due to intelligence a person can adjust with the environment in a suitable manner. It reflects his/her persuasive personality.
- Due to intelligence, a person enable himself/herself for abstract thinking and think rationally.
- A person with high intelligence generally do any difficult task after understand properly.

The intelligence is more than a factor and the abilities to be conceptually clarified for understanding the nature of intelligence. In this reference, **Thurstone (1938)** has given 7 primary abilities and **Guilford (1967)** has given 180 abilities which clarify nature of intelligence.

According to Indian context intelligence is an integrated ability which highlights developing and enhancing abilities in social and global reference. These capacities are included in intelligence:

1. **Cognitive Competence:** Understanding, discrimination ability, problem solving, effective communication etc.
2. **Social Competence:** Social thinking, respect to social systems and rules, social harmony etc.
3. **Emotional Competence:** Emotional maturity, emotional control, self-evaluation, courtesy, good conduct etc.
4. **Entrepreneurial Competence:** Commitment, hard work, patience, goal directed behaviour etc.

Types of Intelligence

E.L. Thorndike has given three types of intelligence which are as follows:

1. Social Intelligence
2. Abstract Intelligence
3. Concrete Intelligence

Social Intelligence: It is a general mental ability in which a person understands other persons and behaves skilfully with them. The persons having high social intelligence have good social relationships and gain social prestige.

Abstract Intelligence: It is a mental ability in which individual understand the relationship of mathematical and verbal signs, symbols and cues and able to explain it properly. This type includes artists, mathematicians etc.

Concrete Intelligence: It is a mental ability in which individual understand the solidity of concepts and objects; execute properly and take use of this in different situations. This type of intelligence is used in business and professions.

Theories of Intelligence:

The theories presented below explain intelligence as an organization of factors. The statistical technique factor analysis is used for determination of factors.

It is segmented into two categories. According to Lumpers the problem solving is done by the use of general and united capacity of intelligence while the splitters assume that intelligence is addition of different independent active mental abilities.

Spearman Two Factor Theory

Spearman has developed this theory in 1904, By applying factor analysis he has found two factors of intelligence named *General* and *Specific* factors. He believe that each individual have different general ability to perform a mental task which is known as factor. Therefore, ‘g’ factor is also termed as mental energy. He believes that quantity of ‘g’ factor determines success. It is an inborn factor. But on the other

side few mental tasks need specific abilities which he has termed as ‘s’ factor. The ‘s’ factor can be enhanced through training. Spearman theory explain that in any intellectual work both ‘g’ and ‘s’ actors are needed but ‘g’ factor possess more importance.

Guilford’s Multiple Factor Theory

According to Guilford all elements of intelligence can be divided into three dimensions which are as follows:

- **Operation**
- **Content**
- **Products**

Operation: The nature of mental process and individual is known as operation. It has six parts namely, evaluation, convergent thinking, divergent thinking, memory retention, memory recording and cognition.

Content: The area through which on the basis of items are information operations are executed is known as content. It has five parts namely, visual, auditory, symbolic, semantic and behavioural.

Product: The product is a result of operation of content. It has six parts namely, units, classes, relations, system, transformation and implication.

The Guilford principle explains $6 \times 5 \times 6 = 180$ factors of intelligence.

Cattell’s Theory of Intelligence

Cattell has developed theory of intelligence in 1963 and 1987. According to him intelligence possesses two important components – **Fluid intelligence** and **Crystallised Intelligence**.

Cattell assumed the fluid intelligence as Spearman ‘g’ factor of intelligence which is affected by genetic factors and is related with

reasoning ability while crystallised intelligence is based on acquired and factual knowledge. Fluid intelligence is developed in adolescence while crystallised intelligence is developed in adulthood.

Gardner's Theory of Multiple Intelligence

Gardner has developed this theory in 1989. According to this theory the nature of Intelligence is not singular one but it is of multiple factors. He proposed that intelligence generally has 7 abilities which are independent from each other. The brain has ability to execute it independently. The 7 types of abilities are as follows:

Linguistic Intelligence: Learning through spoken and written words, reading, listening, speaking, writing and comprehension ability and ability to recognise the relationship between two words.

Logical Mathematical Intelligence: Learning through reasoning and problem solving with numbers and analytical ability.

Spatial Intelligence: Learning visually and organising ideas spatially, images and pictures and 'see' things in one's mind that is spatial visualisation.

Body Kinesthetic Intelligence: Learning through interaction with one's environment, concrete experiences, control over physical movements and carefully take use of the objects.

Musical intelligence: Learning through songs, patterns and musical expression for developing musical competence.

Intrapersonal: Learning to monitor emotions and feelings within a person and to distinguish them.

Interpersonal: Learning through interactions with others, working collaboratively and cooperatively and ability to understand wishes, needs and motives of others.

Gardner believes that in an individual particular type of Intelligence is developed more and these multiple intelligences interact with each other. In the case of brain damage it doesn't affect on other types of Intelligence.

Activity 1.1

- * Make a list of intelligent students of your class.
- * Why you considered the intelligent write five sentences on first Three Students?
- * What characteristics should an intelligent person possess?
- * Have a group discussion on above 3 questions with your teachers and classmates.

Assessment of Intelligence

Age:

Psychologists have segregated age in two types:

1. **Chronological age:** It is the actual age calculated from the day of birth.
2. **Mental age:** It is the age of mental abilities. According to Tuckman (1975), it is a score which can be determined by comparing a child's score with the average score of his or her age-mates and with the score obtained by younger and older children in the norming group.

If mental age is less than chronological age it is known as mental retardation and if mental age is more than chronological age it is considered as gifted child.

Uses of Intelligence Tests

Intelligence tests are used by psychologists in mental hospitals, clinical assessment in rehabilitation centers and for researches. For measuring individual intelligence, Stanford-Binet test, Wechsler Scales, Goodenough Draw-a-man test etc., Cattell's Culture Free intelligence test are popularly used.

Modern psychologists highlight the importance of intelligence tests which are as follows:

Estimation of General Intellectual level:

According to psychologists by the use of intelligence test the individual current potential is measured and assuming that it is a base line score, his achievements can be evaluated.

Prediction of Academic Success: The test like Wechsler Scale, Stanford-Binet test etc. are conducted on students so that their academic success can be predicted on the basis of their intelligence. The academic success and intelligence are not conceptually related but a high positive correlation is observed between intelligence and academic performance.

Emotional Intelligence

It is well said that success and achievement of any individual depends on its intelligence quotient. Present researchers found that the success of any individual is more over dependent on emotional intelligence in comparison to intelligence.

American Psychologists **Salovey and Mayer** had coined the term '*emotional intelligence*'. According to them it is a cluster of abilities related with emotional aspects of behaviour. Emotional intelligence is considered as a type of social intelligence.

The definitions of emotional intelligence are as follows:

According to **Mayor and Salovey (1977)**, "*Emotional Intelligence, is the ability to perceive emotions, to access and generate emotions so as to assist thoughts, to understand emotions and emotional knowledge and to reflectively regulate emotions so as to promote emotional and intellectual growth.*"

Goleman (1998) who is founder and chairman of 'Consortium for Research on Emotional Intelligence' defined emotional intelligence as "*Emotional Intelligence is defined as the capacity for recognizing our own feelings and those of other, for motivating ourselves and for managing emotions well in ourselves and in our relationships. Emotional intelligence describes abilities distinct from but complementary to academic intelligence or the purely cognitive capacities measured by IQ*"

According to **Bar-on (1997)**, "*Emotional intelligence reflects one's ability to deal with daily environmental changes and helps predict one's success in life, including professional and personal pursuit.*"

The analysis of above definitions explores that individual needs emotional intelligence to achieve success. Through Emotional intelligence a person can manage his/her own emotions, distinguishes emotions of other persons. The thinking process and actions are so guided by available information, reasoning with emotions, empathy that it directs the behaviour for the success.

Theory of Goleman

The scientific and theoretical explanation of emotional intelligence is given by **Goleman (1998)**. In his famous book '*Emotional*

intelligence: Why it can matter not the IQ' explains that in achieving success of any individual is 20% dependent on intelligence while 80% on emotional intelligence.

According to **Goleman**, It is the capacity for recognizing one's own feeling as well as of other persons' feelings, for motivating thyself and for managing emotions in thyself and in the relationships. It describes those abilities which are distinct from but complementary to academic intelligence.

The theory of intelligence proposes four types of emotional competencies which makes the unique identity of individual.

1. **Self Awareness:** The ability to understand own emotions, strengths and weakness.
2. **Self Management:** The ability to manage motives and balancing behaviour.
3. **Social Awareness:** The ability to understand other person's deeds, expression and causes.
4. **Social Skills:** The ability to achieve personal goals through behavioural management in society.

According to **Goleman** in varied field of life emotional competence is needed. Therefore he has coined his model as 'theory of performance'.

Measurement of Intelligence

Jensen (1969) narrated that *"Intelligence, like electricity is easier to measure than to define."* Several intelligence tests are available for measuring intelligence.

The first intelligence test was made by **Binet and Simon** in 1905 and **Terman** had revised first time in 1916. In this revision intelligence quotient is used as index of intelligence measurement. The formula for measuring intelligence quotient is $IQ = \frac{MA}{CA} \times 100$ where

MA is mental age and CA is chronological age. Thereafter, **Wechsler**, **Cattell**, **Reven**, **Goodenough**, **Kaufman** contributed in the field of intelligence measurement through developing intelligence tests.

At the time of First World War the need for group test of intelligence is emerged and therefore Army Alpha and Army Beta tests were created for American Army Personnel. Army Alpha test determined the verbal intelligence whereas Army Beta test is a performance or non-language test. Later on both tests were brought together in the form of Armed Forces Qualification Test and Armed Services Vocational Aptitude Test Battery.

The popular tests which measures intelligence are as follows:

1. Binet Test
2. Wechsler Scales
3. Raven's Progressive Matrices
4. Goodenough Draw-a-man Test
5. Peabody Picture Vocabulary Test
6. Cattell's Culture-Free Intelligence Test
7. Kaufman Assessment Battery for Children or K-ABC
8. Bhatia Battery Test

Aptitude

Aptitude is the main part of human ability. It is an inborn or acquired ability of knowledge and skill in different fields.

According to **Freeman (1962)**, *"A combination of characteristics indicative of individual's capacity to acquire (with training) some specific knowledge, skill or set of organised responses such as ability to speak a language, to become a musician or to do mechanical work."*

According to **Tuckman (1975)**, *"A combination of abilities and other characteristics whether*

native or acquired, known or believed to be indicative of an individual's abilities to learn or develop proficiency in some particular area."

The above definitions are able to draw important aspects of aptitude which are as follows:

1. Aptitude is getting potential for proficiency in specific area.
2. The potential which is present in an individual may be inborn or acquired.
3. It is a characteristic of an individual by which assessment and evaluation of knowledge can be done.

Aptitude tests are developed to measure potential of an individual in specific area. It is different from achievement test as achievement test is executed after training whereas aptitude test determines the pre-training situation. It is a cognitive test if able to predict performance in specific area is called aptitude test. Several tests are predictive in nature but can't measure cognitive skills are not aptitude tests.

Stanford Binet Intelligence Scale, WAIS, WISC, WPPSI tests measure cognitive skills if used for predicting individual's ability then these tests are considered as general aptitude tests.

Measurement of Aptitude

Aptitude tests can be divided into two parts

(a) Multi Aptitude Batteries

(b) Specific Aptitude Test

(a) **Multi Aptitude Batteries:** The test which measures several potential abilities in various areas are called Multi Aptitude Batteries. Some of the Multi Aptitude Batteries are described below:

1. **Differential Aptitude Test:** It is an important test for employment testing. **Benett, Seashore and Wesman** has developed this test in 1947. Later on many

revisions of this test are published. The test consists of 8 sub tests which are, verbal reasoning, numerical ability, abstract reasoning, clerical speed and accuracy ability, space relations and spelling and language accuracy ability. This test is used for educational and vocational guidance for students of 8th standard to 12th standard. It takes 3 hours of time in completion. The raw scores are converted into percentile for each test separately. A ninth sub score is also determined through summation of scores obtained on verbal reasoning and numerical ability tests which measures general scholastic aptitude. The Indian adaptation of this test in Hindi language is done by Prof. J.M. Ojha.

2. **General Aptitude Test Battery or GATB:**

This test is developed by **American Employment Service** in 1962 for the use in armed services. It has 12 sub tests measuring 9 factors which are intelligence or general mental ability 'G', Numerical aptitude 'N', verbal aptitude 'V', Spatial Aptitude 'S', form perception 'P', clerical perception 'Q', motor coordination 'K', finger dexterity 'F', and manual dexterity 'M'. Out of 12 tests 8 are verbal and 4 are non-verbal tests. The test measures finger dexterity 'F' and manual dexterity 'M' through apparatus. The alternative forms are available for measuring intelligence or general mental ability 'G', Numerical aptitude 'N', verbal aptitude 'V', Spatial Aptitude 'S', form perception 'P', clerical perception 'Q' and motor coordination 'K'. GATB is used for employment services. The speed is given more importance in this test. Exclusion of

mechanical reasoning is the main limitation of this test.

3. **Flanagan Aptitude Classification Test or FACT:**

This test is used for vocational counselling and for employee selection. It measures 21 vocational aptitudes in which 19 vocational aptitudes are measured through verbal tests and 2 vocational aptitudes are measured through performance tests. It takes 10 hours and 30 minutes in completion of the test.

(b) **Specific Aptitude Test:** The potential which is used for specific work is measured through specific aptitude tests. Some of the specific aptitude tests are described below:

1. **Clerical Aptitude Test:** This test is used for measuring clerical aptitude i.e., ability to perform the task with speed and accuracy. Minnesota Clerical Aptitude test is the main example in this category. This test is divided into two parts namely name comparison and number comparison. The responses are to be given in prescribed time limit.
2. **Mechanical Aptitude Test:** This test is used for measuring mechanical aptitude. Generally each aspect of mechanical aptitude is measured through different tests, some of these tests are given below:
 - a. Mechanical Aptitude Test
 - b. Information Test
 - c. Mechanical Reasoning
 - d. Dexterity Test
 - e. Spatial Relations Test.
3. **Musical Aptitude Test:** Musical aptitude is measured through musical aptitude test. **Seashore** Measures of Musical Talent is a famous musical aptitude test made by Seashore. In this test individual listens 6

photographic records for auditory discrimination which includes, pitch, loudness, time timbre, rhythm and total memory. **Wing** standardized test of musical intelligence is another famous musical aptitude test which was developed by Wing in England. This test consists of seven sub-tests namely, chord analysis, pitch discrimination, memory of pitch, harmony, intensity, rhythm and phrases.

4. **Artistic Aptitude Test:** Artistic aptitude is measured through Artistic Aptitude tests. It has two types aesthetic judgement and aesthetic production. **Meir** Art Judgement test famous artistic aptitude test in which 100 pairs of black and white plates are given, individual has to select one person from one pair. The decision given by the subject is a measure of aesthetic aptitude. **Horn** Art Aptitude Inventory is developed for measuring aesthetic production which has two parts, the scrooble and doodle section and imagery section. The subject has to highlight 20 familiar objects in 3 - 10 seconds in first part while in second part the person has to draw images in 12 rectangles. A variety of tests for measuring artistic aptitude are available.

Important Points

- *Intelligence is an ability to understand the environment for adoptability, rational thinking and maximum utilization of available resources for problem solving.*
- *Intelligence can be measured through intelligence quotient. Many verbal and performance tests are available for measuring intelligence.*

- *Intelligence can be understood through theories given by Spearman, Cattell, Gardner etc.*
- *Emotional intelligence includes awareness and managing emotions, self motivation, empathy, and handling relationships which leads to success.*

Practice Questions

Multiple Choice Type

1. What is the intelligence quotient of a child having chronological age 10 years and mental age 12 years?
(a) 80 (b) 100
(c) 120 (d) 1.2
2. How many factors of intelligence are there according to Spearman theory of Intelligence?
(a) 1 (b) 2
(c) 3 (d) 4
3. Which word is not related with Guilford theory of intelligence?
(a) Operation (b) Profit
(c) Content (d) Product
4. Who has propounded the concept of Emotional Intelligence?
(a) Salovey and Mayer
(b) Guilford and Spearman
(c) Simon and Binet
(d) Cattell and Gardner
5. What is measured by DAT?
(a) Intelligence
(b) Emotional Intelligence
(c) Attitude
(d) Aptitude

Short Answer Type

1. Define Intelligence.
2. What is formula for calculating IQ?
3. Define Emotional Intelligence.
4. Define Aptitude.
5. Write name of four intelligence tests.

Essay Type

1. Write nature of intelligence and characteristics of intelligence people.
2. Write a note on measurement of intelligence?
3. Explain any two theories of intelligence.
4. What do you mean by emotional intelligence and highlight the importance of emotional intelligence in present era.
5. Write a note on Aptitude measurement.

Answers - Multiple Choice Questions

1 (c) ; 2 (b); 3 (b); 4 (a); 5 (d)