
UNIT 18 GARDNER'S THEORY OF MULTIPLE INTELLIGENCES

Structure

- 18.1 Introduction
- 18.2 What is Intelligence?
- 18.3 Cultural Conception of Intelligence
- 18.4 How is Intelligence Measured?
 - 18.4.1 Limitations of Intelligence Tests
- 18.5 Intelligence — One General Mental Ability or Combination of Several Separate Abilities?
 - 18.5.1 General Intelligence and Specific Intelligence
 - 18.5.2 Multiple Intelligences
 - 18.5.3 Use of the Theory of Multiple Intelligences in Education
 - 18.5.4 Limitation of the Theory of Multiple Intelligences
- 18.6 Summing Up
- 18.7 Answers to Check Your Progress Exercises

18.1 INTRODUCTION

Psychologists have given various definitions of intelligence based on their research. However, each one of us has our views as well and we use these views in making judgments about people when we interact with them. It is important that we think and analyze our own beliefs regarding intelligence, as this will affect how we interact with children and adults.

In this Unit, we will do both of the above.

Objectives

After studying this Unit, you should be able to:

- explain the term 'intelligence' and understand that several mental abilities make up our 'intelligence';
- state the issues related to the measurement of intelligence;
- describe the theory of 'multiple intelligence; and
- use the theory of 'multiple intelligence' in education.

18.2 WHAT IS INTELLIGENCE?

So before we read the definitions of intelligence in psychological literature, let us uncover our personal beliefs by answering the following questions:

- a) Think about yourself for some time. Would you call yourself intelligent? Whether you answer 'yes' or 'no', write why you think so. What are you thinking of when you call yourself intelligent/not intelligent or not so

intelligent? What terms would you use in your local language for 'intelligent'? In Hindi language, people often use the terms 'samajdaar' / 'akalmand' / 'buddhimaan'.

b) Now think of adults around you. They could be working /non working, men/women, your friends or colleagues at work. Whom among them do you consider very intelligent and why?

.....
.....
.....
.....
.....
.....

c) Would a person never been to school, be considered as intelligent? Whether you answer 'yes' or 'no' write why you think so.

.....
.....
.....
.....
.....

d) Now ask these questions to people around you – your friend your parents or colleagues. Are their answer similar to your or different?

.....
.....
.....

Did your reasons for considering yourself or another person 'intelligent' include any of the following?

- Because one can handle a difficult situation effectively or can give appropriate advice to others in difficult situations
- Because one is able to manage one's work life successfully and make good money, even if one is not well educated
- Because one passes a competitive examination successfully or is able to find a good job
- Because one is in a good position in one's profession
- Because one is good at managing one's day-to-day life
- Because one is able to run the household successfully

- Because one behaves in an appropriate manner in social situations, is socially well adjusted and liked by others.
- e) We are asking you the above questions in a different way now. Think about the following:
- Most of us will agree that scientists such as Srinivasa Ramanujan, Albert Einstein, Isaac Newton, Thomas Edison and Alexander Fleming; famous writers such as Rabindranath Tagore, Munshi Premchand, William Shakespeare, Jane Austen, Charles Dickens; great political leaders such as Sarojini Naidu, Abraham Lincoln, Winston Churchill, Mahatma Gandhi, and philosophers like Plato, Aristotle, John Locke, Karl Marx, Bertrand Russell and Tulsidas, Chanakya, Panini, Patanjali, Vyasa and Birbal are intelligent people of all times. Why do we consider them intelligent? Because they are well known? Any other reason?
 - Would we agree that spiritual leaders such as the Buddha, Guru Govind Singh, Swami Dayanand Saraswati and Swami Vivekananda, or musicians such as Mozart, Tansen, or painters and artists such as Leonardo da Vinci, M.F. Hussain, Tyeb Mehta, Amrita Shergil are intelligent; or sportspersons such as Gary Kasparov, Vishwanathan Anand, Sunil Gavaskar, Kapil Dev or Sachin Tendulkar, Leander Paes are intelligent? Why? Why not?
 - Is a farmer who produces a good yield from his field, a fisherman who gets a good catch of fish each day, a lady who manages her house within the resources available to her ‘intelligent’?
- f) Now think back to your school days — whom did you consider being the most intelligent children in your class? Whom did the teachers consider intelligent? Why did you /teachers consider these children intelligent? We have given some reasons below – if your reasons match ours, you can tick these or give your own reasons.
- Because s/he was good in studies and got good marks
 - Because s/he could do mathematical calculations quickly, especially mental sums
 - Because s/he had information about many things
 - Because s/he could learn subject matter very fast
 - Because s/he was good in sports or music/dance/painting (extracurricular activities) even if she was not good in studies
 - Because s/he was creative and innovative, always coming up with new ideas which were useful
 - Because if someone was in a difficult situation s/he could think of a solution and could help the person
 - Any other reason

.....
.....
.....

g) After having done the above exercises, if we were to ask you, "Do you think everyone is intelligent?". What would you say?

.....
.....
.....
.....
.....
.....

If you reflect on your answers, you may find that

- 1) Often you have used different criteria for different people and in different situations.
- 2) A child can be intelligent in many different ways.

With school going children, often when we say that a child is intelligent, we say so, on the basis of the marks that she gets in school. Many children get good marks by memorizing the content and writing it in the examinations. They may not have understood what they have learnt and if you ask them to explain it in their own words, they may not be able to do so. Is it correct to call them 'intelligent'?

When a child is good in sports but not in studies, we adults often do not describe her as intelligent. Do you think this is correct? Think what is involved in playing a sport well. You have to understand the rules of the game, develop the ability and skill and keep refining it till you achieve perfection; when you are playing a match you have to consider how your opponent will play and change or adapt your game accordingly. When teams play against each other, for example a football match, you would have seen how they constantly consult with each other and change their strategies. Is this not intelligent behaviour? Can a team win without intelligent planning?

In the same way think what is involved when a child begins to learn dance or music or some sport. Is this not being intelligent? What would you say of a child who writes good poetry or an essay or who is a good debater but does not score too well in the examination?

In a discussion a researcher had with a group of 15 year olds, the boys said that they considered themselves intelligent because they could solve problems which came up in their day-to-day life – such as repairing electrical connections at home or electrical items; these boys were average in studies and got average marks. Their teachers did not think they were very intelligent, but they did.

The difficulty is that because of the emphasis placed on marks in our society, we only focus on marks as an expression of one's intelligence. **But a child can be intelligent in many different ways.** The irony is that

if the child is getting the marks simply by memorizing, but without understanding, then certainly, the child's marks are not an indicator of her intelligence.

3) **What is considered 'intelligent' depends on the situation.**

Let us come out of the school situation into the everyday world to understand this. Sometimes parents call their child intelligent for completely contrasting behaviours, depending upon the situation. In some situations when the child takes decisions and acts independently she is called intelligent; in other situations the same child may get scolded for taking decisions independently without asking the parents. **This means that what is considered 'intelligent' depends on the situation** – the same action may be intelligent action in one situation but not in another.

4) **Different abilities and behaviours are considered intelligent by people at different stages of the life cycle.**

In a study by Sternberg, college students were asked to describe the nature of intelligence in a 6 month old infant, 2 year old child, 10 year old child and in adults. The students reported different traits as characterizing intelligence at different ages. For 6 month old infants, they considered recognition of people and objects, motor coordination, alertness, awareness of the environment and verbalization as important qualities which showed the infant's intelligence. For 2 year old children, they reported verbal ability, learning ability, awareness of people and environment, motor coordination and curiosity as important aspects of intelligence. For 10 year old children, the most important traits reported were verbal ability in the first place, followed by learning ability, reasoning ability and problem solving ability at second place and then creativity. For adults, the college students reported that the important traits of intelligence were reasoning ability, verbal ability, problem solving ability, learning ability and creativity. Hence, it can be clearly seen that the perceptual-motor traits are considered as an important aspect of intelligence for infants and toddlers, while for children and adults, the cognitive abilities (such as learning ability, reasoning ability and problem solving abilities) are considered as important aspects of intelligence.

In another study conducted on school teachers, it was found that elementary school teachers (Classes I - VIII) considered social traits such as popularity, friendliness, respect for law and order and interest in the environment as important aspects of intelligence of children. On the other hand, secondary school teachers (of Classes IX-XII) emphasized verbal abilities most while defining intelligence. A third group of teachers, college teachers — stressed intellectual abilities such as reasoning abilities, knowledge, logical thinking and ability to deal maturely with problems when they were asked to define intelligence. Here again, it can be clearly seen that cognitive abilities were emphasized more by the teachers at colleges (who dealt with college students) than by secondary and elementary school teachers.

A very interesting study was conducted on the students of grades I, III and VI to know about the views of children regarding intelligence and it was found that there is a tendency among young children to think about intelligence largely in terms of social skills, while older children view intelligence mainly in relation to academic skills.

The important point to understand from these researchers that we are quoting is that **a wide variety of behaviours is considered as 'intelligent'**. Motor coordination and control is as much intelligent behaviour as is being friendly or being able to reason. In other words, we can say that intelligence is revealed through physical and motor acts in case of infants and young children and through mental acts of reasoning and problem solving in case of older children. But remember, thinking or cognition is involved in physical and motor acts also. So what this means is that we try to judge a child's thinking or intelligence or cognition from her physical-motor-perceptual acts.

Studies have also been conducted on children regarding their views about whether intelligence increases with age or not. These studies indicate that children have basically two types of views — 'entity view' and 'incremental view' — regarding intelligence. Children with 'entity view' believed that intelligence is inborn and remains stable across the life span. Hence, one cannot do much to increase one's intelligence. It was found that these children did not make an effort to learn something new, but preferred doing what they already knew well so as to 'look good' to others at work. They did not want to make mistakes and risk failure in any way. While children with 'incremental view' believed that intelligence increases with age through learning. It was found that these children were more inclined to learn and seek new challenges that would help them to improve their intelligence.

5) A person's definition of intelligence may be quite different from what is held as intelligent behaviour by the society.

Let us now come to some more perspectives regarding who is considered as an intelligent adult. We often think of a person as intelligent if she has a good income and a prestigious job. But what about people who choose occupations that are personally meaningful to them but that will never yield the income that they could gain by doing work that is less personally meaningful. Sometimes the circumstances are such that a person has no choice but be where she is, even if that job or situation is something which is not to the person's satisfaction. If this person adjusts to her life situation and manages her multiple responsibilities at work place and home appropriately, with a cheerful attitude towards life, should she not be considered intelligent?

This also brings us to the question whether intelligence should be defined as one's ability to achieve success in life in terms of one's personal standards or is it that only when others (teachers, society, parents) recognize that we are intelligent that we would be considered intelligent?

6) What a society or group of people consider as intelligent behaviour also changes with time.

When a child chooses to concentrate on extracurricular activities such as athletics or music, and pays less attention to grades in school and then makes a career on the basis of her interest in extracurricular activities, should she be considered as less intelligent, just because such a career may not be considered prestigious in society? But we also know that things are changing in society. Alternate careers other than in traditionally prestigious occupations – doctor, lawyers, managers - are now becoming popular. So this means that what society considers as intelligent behaviour also changes with time.

Does all this reading give you the feeling that it is difficult to decide what intelligence is? Well, even psychologists and researchers have controversies over the meaning of the term ‘intelligence’ and surprisingly there is still no single standard definition of intelligence. Let us now read how the notion/ idea of the concept of intelligence has changed or evolved over the many decades.

So, how do we exactly define the term ‘intelligence’?

Some of the well known definitions of intelligence given by various psychologists over the past century are listed below:

Psychologist	Year	Definition of Intelligence
1. Alfred Binet	1905	Judgment, otherwise called “good sense”, “practical sense”, “initiative”, the faculty of adapting one’s self to circumstances.
2. L. M. Terman	1916	The ability to carry on abstract thinking.
3. B. A. C. Henmon	1921	The capacity for knowledge and knowledge possessed.
4. E. Boring	1923	Intelligence is what is measured by intelligence tests.
5. Cyril Burt	1931	Innate general cognitive ability.
6. David Wechsler	1944	The aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment.
7. Howard Gardner	1983, 1999	A human intellectual competence must entail a set of skills of problem solving — enabling the individual to resolve genuine problems or difficulties that he or she encounters and, when appropriate, to create an effective product — and must also entail the potential for finding or creating problems — and thereby laying the groundwork for the acquisition of new knowledge.
8. Reuven Feuerstein	1979, 2002	The unique propensity of human beings to change or modify the structure of their cognitive functioning to adapt to the changing demands of a life situation.

Read the above definitions. These definitions cover one or two aspects. Study them carefully. Can you find some common features in these definitions?

It is very much evident from the table given above that:

- i) Psychologists generally consider thinking processes such as problem solving and abstract reasoning as important aspects of intelligence.
- ii) Another aspect of intelligence generally agreed upon by various psychologists is that it is the ability to adapt successfully to the environment and changing life situations.

Interestingly, in 1923, E. Boring had sparked off a major controversy about what is intelligence and whether intelligence tests adequately measure it or not when he defined intelligence as “intelligence is what is measured by intelligence tests”.

Hence, we can infer from the above discussion is that despite differences in their approaches to intelligence, all psychologists agree that ‘Intelligence’ is an umbrella term which we use to refer not to a single mental process but rather “a combination of many mental/thinking processes/actions such as learning, understanding, judging, reasoning, planning, problem solving, thinking abstractly, calculating, memorizing, perceiving relationships, storing and retrieving information, classifying, generalizing, using language fluently and imagination. It also indicates a person’s ability to adjust to new situations and adapt effectively to the environment”.

With this understanding of intelligence, it becomes clear that as we carry out our tasks each day and adjust to situations and take appropriate action we are displaying intelligent behaviour. This means that all people use their intelligence and act and behave intelligently most of the time; at times when these actions do not lead to appropriate adjustment with their environment we say that they have been unintelligent. However, our present day competitive society has limited the use of the word ‘intelligence’ to such a narrow set of behaviours and outcomes, that it seems that there are only a few intelligent people around us. Intelligence has been equated with material success in case of adults and academic success in case of children which is one sided and an incomplete view of intelligence.

Does the definition of ‘intelligence’ appear similar to that of ‘cognition’? How are the two terms different? How are the two terms used in child development?

The term ‘cognition’ also refers to many mental processes such as paying attention, perceiving, thinking, reasoning, judging, problem solving, calculation ability, remembering, learning, planning, self-monitoring, imagination, creativity and the comprehension and use of language. Hence, the definitions of ‘intelligence’ and ‘cognition’ appear similar. However, the term ‘cognition’ is a broader concept and includes all mental activities that we engage in i.e. our thoughts and also all conscious mental activities that inform us about our environment. As you have read, cognition means ‘to know’... so cognition is the sum total of all the abilities and processes that

we use to know (refer Unit 9 for details). The term ‘cognitive development’ means ‘development of our thinking’. Nevertheless, the two terms ‘cognition’ and ‘intelligence’ are used interchangeably in child development. The one difference we can say is that when the term ‘intelligence’ is used it is used in the sense of the *abilities shown by the person* for thinking, judging, learning etc; when we use the term cognition we use it to refer to the *process* of thinking, judging, learning etc; our objective then becomes to understand how a person comes to do/ learns to do all these. To use a metaphor from theatre we can say ‘cognition’ is what happens back stage while ‘intelligence’ is what is visible to everyone on stage.

A point which we would like to clarify is the following:

While intelligence and cognition involve mental processes, we use intelligence and cognition in all activities from all domains of development. Thus, when you are tying a shoelace (domain of motor development) you are perceiving, judging and thinking; when you are interacting with people (domain of social development) you are also using reasoning, self monitoring, using language and many other processes. When you are trying to control your emotions (domain of emotional development) you are using many of these processes.

18.3 CULTURAL CONCEPTION OF INTELLIGENCE

Have you considered that intelligence may mean different things in different societies and cultures? While all aspects of intelligence are seen as important in most cultures, the difference is in terms of what is emphasized in any particular culture.

Intelligence is perceived in different ways in different cultures. For instance, the conception of intelligence is quite different in eastern and western cultures. In western cultures, a person is seen as intelligent depending mainly upon (i) the ability of the person for practical problem solving, (ii) verbal ability and (iii) social competence. However, they give more importance to high performance on cognitive/mental tasks (such as practical problem solving, verbal reasoning, memory tasks etc.) as compared to whether the person is socially competent or not. That is, they place more emphasis on cognitive abilities than on social skills while defining intelligence. If you read the definitions of intelligence described above, most of which have been given by Western scholars, you can clearly see that there is more emphasis on cognitive skills (viz. problem solving, reasoning, judging, memory, attention, perception, imagination, creativity and verbal abilities) than on social skills (ability to get along with people, communication with people, displaying appropriate behaviour). The traditional intelligence tests, commonly known as I.Q. tests (I.Q. meaning intelligence quotient; described in the next section of this Unit) also mainly assess problem solving and verbal abilities of a person.

However, in Asian and African cultures, while people do define intelligence in terms of the cognitive abilities, they also put more emphasis on the social aspects of intelligence such as taking up social responsibilities, cooperativeness, obedience and responsible participation in family and social life, as important aspects of intelligence. Intelligent children are expected to be respectful of adults and having good relationships with the family.

The socio-cultural environment in different societies may also determine what are considered as prestigious occupations. The occupation which is considered highly rewarded in one culture may not be respected in another culture. For example, being a successful member of the clergy of a particular religion may be highly rewarded in one society, but viewed as a worthless occupation in another.

Check Your Progress Exercise 1

- 1) Define the term 'Intelligence'.

.....
.....
.....
.....
.....
.....
.....
.....
.....

- 2) Is 'intelligence' same as 'cognition' or different? Elaborate with examples.

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

18.4 HOW IS INTELLIGENCE MEASURED?

In the past two centuries, psychologists have developed ways of measuring intelligence.

One of the first to investigate individual differences in intelligence was a British scientist, Sir Francis Galton. According to him, a person's intelligence was related to the person's level of sensation. In other words, how much and what information the person could perceive through the senses determined intelligence. He believed that the person's sensory acuity (Acuity means acuteness or keenness. Hence, sensory acuity is basically the acuteness or keenness with which senses detect fine details of the stimuli) not brain size, determines the intelligence of the person. According to Galton:

- i) the better the ability of the eyes to see or better the sense of hearing of a person, the higher would be his I.Q.
- ii) the more the person is exposed to a variety of stimuli, the higher would be the I.Q of the person.
- iii) the keener the senses of a person, the more intelligent a person was.

Therefore, to assess people's intelligence he designed tools to measure visual acuity (the ability of the eyes to see fine details), auditory accuracy (the sense of hearing), people's breathing capacity, reaction time (time taken by a person to react) and sensory-motor responses (actions in response) to stimuli presented.

He also measured the head sizes of a large number of people to see if intelligence was related to the head size. He found that head-size was unrelated to a person's intelligence.

Galton also believed that an individual's intelligence was inherited. He studied children of well known and distinguished parents such as judges, statesmen, commanders, literary men, scientists, poets, musicians, painters and wrestlers and also gifted children who came from the general population. He found that more children of distinguished parents were famous in adult life, as compared to the children from general population. Hence he advocated the idea of improving the general intelligence of people by selective marriage and reproduction between gifted individuals. This selection of 'good genes' was referred to as 'eugenics' by Galton.

Galton's studies were carried forward in the United States by psychologist James McKeen Cattell. Cattell coined the term, "mental tests" to refer to Galton's sensory acuity, reaction time and sensory motor response tests for measuring intelligence. Cattell and his students conducted several studies but could not find any relationship between sensory responses and intellectual performance (academic grades). Hence, Galton's approach to measuring intelligence was abandoned. Although there is a renewed interest in the Galton's work and psychologists do agree that sensory abilities are related to intelligence i.e. a person who is able to make fine sensory discriminations (is able to see finer details, has better hearing ability and is able to make better tactile discriminations by touching and pointing out differences between

rough, smooth and hard and soft surfaces etc.), he does have superior intelligence, as compared to a person whose sensory acuity is lower.

Around this time (in the 1890s) when Galton's approach towards measuring intelligence was abandoned, Binet, a leading French psychologist, argued that individual differences in intelligence could be detected through measures of mental processes such as memory, imagination, attention and comprehension etc. Based on this idea, he and his colleague Theodore Simon developed an intelligence test in 1904, when the French government asked him to help them detect children who would not do well in formal schools and needed special teaching and extra help. The Binet-Simon Scale consisted of items which tested the child's practical knowledge, memory, reasoning, vocabulary, and problem solving abilities. Even the present day intelligence tests measure these abilities. Binet and Simon introduced the concept of **mental age** for a child, which was supposed to be an indicator of the child's intelligence. A child of any age who scored as well as an average twelve-year-old, for example, was said to have a mental age of twelve.

Thereafter during World War I, the U. S. Army saw a need for a quick-to-administer intelligence test to be used while recruiting people for the army. Psychologists Lewis Terman, Robert Yerkes and several other psychologists together developed group tests known as the **Army Alpha** and **Army Beta** tests, which could be administered to a large number of people at a time. The Alpha test emphasized verbal abilities and was given to everyone. The Beta test emphasized non-verbal abilities and was to be given to only those individuals who performed poorly on the Alpha test and were considered to have language problems. After the World War I was over, the data collected from these tests was analyzed in depth and the mental age of people was calculated. A large number of people were predicted to be mildly mentally retarded, which was incorrect! Actually, intelligence of an individual does not grow linearly after adolescence and hence 'mental age' concept cannot predict the intelligence of adults correctly. Soon after this, Binet's test was brought to the United States. It was revised at Stanford University and renamed as the "Stanford-Binet" test in 1916 by L.M. Terman. In the Stanford-Binet intelligence test, the concept of intelligence quotient (or IQ) was introduced, which solved the problem of measuring intelligence. The IQ is calculated by dividing the test taker's (child or adult) mental age by their age in years, and then multiplying this number by 100. For example, a 10 year old child, with a mental age of 12 would have an IQ of 120 ($12 / 10 \times 100$). The Stanford-Binet remains a popular intelligence test even today. The other most popular intelligence tests are Wechsler Intelligence Scale for Children and Wechsler Adult Intelligence Scale (WAIS) for adults, developed by the American psychologist David Wechsler in 1955.

These I.Q. tests are widely used specifically to test the intelligence of special needs children (developmentally delayed, hearing impaired, visually impaired and cerebral palsied children) so that their level of intelligence can be assessed and children with mental retardation can be detected and provided with special education from an early age. Now-a-days several national level standardized group IQ tests are used in many competitive exams such as in

educational competitive exams (medical, engineering entrance exams and college entrance exams), in military services and civil service exams and in many government and private job recruitments, due to their efficacy in predicting intelligence and behaviour. It has been found that people with high I.Q. as measured by these intelligence tests perform successfully on jobs and are socially competent as well.

18.4.1 Limitations of Intelligence Tests

1) The IQ tests tend to be “culturally biased”

- a) Most I.Q. tests contain some test items that are more familiar to the members of certain cultures. This means that the test items may be related to the experiences that are more common in a particular culture and not in other cultures. For e.g., in Stanford Binet Test, there is a question related to advantages of a typewriter. Now, this question can be answered well by the children who are familiar with a typewriter, but not by children from agriculture communities where they may not have had experience of typewriters.
- b) The test items may be more familiar to school going children but totally new to children who do not go to school. Thus, children who do not go to school may not perform on I.Q. tests as well as school going children. So the intelligence of non school going children would not be measured correctly by the I.Q. tests. The following examples will make this more clear to you:
 - While non-school going children may be able to handle money and be proficient in doing calculations related to giving and taking money to run their business (for example, that of selling newspapers or flowers), when the same concept is given to them in the form of a formal mathematical problem in the classroom/ I.Q. testing situation, they might not be able to solve it. Although the mental processes needed for solving mathematical problems are the same in both cases i.e in the classroom and the situation of their business, since street children are unfamiliar with the formal classroom learning environment and the presentation of mathematical problems in abstract form, they may be unable to solve it.
 - Similarly, street children are unfamiliar with the testing materials like puzzles or picture cards and when they use them for the first time while doing the intelligence test, they may not perform well.
- c) If the answer given by the person to a particular item does not match the accepted responses mentioned for it in the I.Q. test, the response is scored as incorrect. The following instances would make this point clear to you:

- In a research study on people of Kpelle tribe of Liberia, people were told to put 20 objects into groups, based on some common property or function. They grouped 'knife' with 'orange' saying that you cut an orange with a knife. Now, this was an intelligent response but the researcher could not score it since it was not among the accepted answers mentioned in the test.
 - Similarly, in a testing situation, suppose a 4 year old child is asked, "What is a house made of?". The answer "A house is made of walls" would be considered wrong. The correct answer must give materials — like wood, bricks, or stone.
- d) The language of the intelligence test is also an important limitation. For e.g., if the I.Q. tests in English are used with children who do not know English proficiently, they may not understand questions correctly and so may give wrong answers. For this reason, many tests have been adapted in different languages, to suit the needs of different people.

Psychologists have tried to develop '**culture-fair**' tests — *i.e. I.Q. tests which contain only those items which are based on experiences common to people of all cultures and socio-economic backgrounds*. But no test developed so far is found to be really '**culture-fair**'. All intelligence tests contain test items which are more familiar to some groups than to others.

2) That the carrying out of the IQ test is done in a test-like situation is also an important limitation of I.Q. test:

Such factors as rapport (degree of understanding, bond, friendliness) with the test-giver, knowing how to sit still and pay attention to questions asked by adults, interest in tasks, clarity of the question asked affects the test scores of children. It has been found that children often do better on I.Q. tests in familiar settings (like their own classroom) with examiners they know (like their own teachers), than in strange rooms with unfamiliar examiners.

3) The I.Q. tests do not measure the learning potential of the child:

The I.Q. tests require children to work alone or answer what they know. Thus, they measure what the children can do independently but not what they can do with help (the learning potential of the child). According to Vygotsky, the learning potential is a very important aspect of intelligence and cannot be ignored. For example, suppose there are two 8 years old children. Both of them can independently complete test items meant for 8 years old children and therefore, their I.Q. is considered to be the same *i.e.* $8/8 \times 100$ (*i.e.* Mental age/Actual age $\times 100$) = 100. Now suppose, with help from an adult, one of them can solve test items meant for a 12 year old child. Hence, her learning potential is higher than the second child. But I.Q. test is reflecting his intellectual capacities to be the same as that of the other child. This is sometimes seen as a limitation of the I.Q. test.

4) The I.Q. tests do not measure all aspects of intelligence:

The IQ tests focus mainly on numerical ability, logical and verbal reasoning of the children i.e. ‘general intelligence’. These are normally the abilities which are required for learning in school. Thus, these tests largely assess learning that has taken place in school and predict how successful the child can be in school life. However, intelligence is a much broader concept and includes many other mental abilities such as paying attention, perceiving, thinking, comprehension and use of language, everyday knowledge, practical knowledge, memory, imagination, creativity, musical talent, ability to understand spatial relationships. Therefore, a child who does not excel in mathematical, logical and verbal reasoning, but is superior in other aspects of intelligence cannot be considered as less intelligent. Therefore, one can conclude that traditional IQ tests do not provide the complete picture of the person’s intelligence.

Check Your Progress Exercise 2

- 1) Below are some of the intelligence testing methods. Write the names of psychologists who were behind these methods.
 - a) Sensory motor response tests
 - b) Mental tests
 - c) Army Alpha tests
 - d) WAIS
- 2) Write a few limitations of intelligence testing in the space provided below.

.....

.....

.....

.....

.....

18.5 INTELLIGENCE – ONE GENERAL MENTAL ABILITY OR COMBINATION OF SEVERAL SEPARATE ABILITIES?

It is very clear from the above discussion that these tests were developed to measure intelligence and express it in the form of a single numerical value i.e. ‘I.Q.’. However, these mental tests are unable to measure all aspects of intelligence. Hence, there has been major controversy among psychologists over the years whether intelligence is a single general mental ability which can be expressed as a single numerical value (as done in these I.Q. tests) or it is a combination of several separate intelligences which cannot be expressed

as a single numerical value. Some psychologists have suggested that intelligence is a single, general mental ability while others have supported the concept of 'multiple intelligences' believing that intelligence encompasses several separate abilities. Now, we shall discuss these views about intelligence in detail.

18.5.1 General Intelligence and Specific Intelligence

Some psychologists believe that intelligence is a basic general mental ability that affects general performance on various cognitive tasks ranging from solving a mathematical problem or a riddle, writing poems/ speeches/ stories etc., understanding and memorizing subject matter, applying acquired knowledge in practical life and thinking of creative solutions to problems. This view has been most prominently put forth by Charles Spearman (1927). Actually, Spearman while doing his research, applied several mental tests on people to study their different cognitive abilities. He found that if a certain person performed well on a test assessing verbal ability, then that person performed well on other cognitive ability tests also (for example mathematics tests etc.). Hence, he gave the concept of 'general intelligence' or 'g' suggesting that this general factor influences performance on all cognitive tasks such as reading, writing, solving a mathematical problem, imagination, creativity etc.

He further proposed that in fact individuals have both general intelligence and specific abilities and that these two together affect performance on the cognitive tasks. Hence, according to Spearman, a person's general intelligence would help to solve a mathematical problem, write a poem, memorize and recall a subject matter or solve a puzzle etc. but specific intelligence in any one of these tasks would help to increase the scores on that particular task.

Another prominent view regarding intelligence was given by Raymond Cattell (1963) and John Horn (1998). According to them, there are basically two factors that are part of the general intelligence:

- 1) Fluid intelligence: It is the ability to think and reason logically and quickly and solve problems in novel situations. This ability is considered independent of learning, experience, and education. Examples of the use of fluid intelligence include solving puzzles, pattern recognition etc. This type of intelligence tends to decline during late adulthood.
- 2) Crystallized Intelligence: It includes learning, knowledge and skills that are acquired over a lifetime. Crystallized intelligence is indicated by a person's depth and breadth of general knowledge, vocabulary, and the ability to reason using words and numbers. It is the product of educational and cultural experience, in interaction with fluid intelligence.

Fluid and crystallized intelligence are thus related to each other, and most IQ tests measure both. For example, the Wechsler Adult Intelligence Scale (WAIS) measures fluid intelligence on the performance scale and crystallized intelligence on the verbal scale. The overall IQ score is based on a combination of these two scales.

The most widely accepted view today is that intelligence is a hierarchy of abilities with general ability at top and specific abilities at lower levels of hierarchy. Carrol (1997) has suggested three levels of intelligence. According to Carrol, at the topmost level is general ability, at the second level, there are some broad cognitive abilities (such as fluid and crystallized abilities, learning and memory, perception, processing speed etc.) and at the third level there are about 70 specific abilities such as language development, simple reaction time, creativity etc.

Psychologists agreeing with the concept of general and specific intelligences believe that general intelligence is related to the functioning and maturation of the frontal lobes of the brain, while specific intelligences are related to the development and maturation of the other parts of the brain.

However, many psychologists do not agree with view of general and specific intelligences. According to them, intelligence is a combination of several separate intelligences. Hence, they have proposed the concept of ‘multiple intelligences’. The most prominent such view is of Howard Gardner. Now, we shall discuss in detail ‘the theory of multiple intelligence’, proposed by Gardner.

18.5.2 Multiple Intelligences

The **theory of multiple intelligences** was proposed by Howard Gardner in 1983. Gardner argues that the ‘general intelligence’ factor does not encompass all the intellectual abilities of the individual. Also, the I.Q. tests generally access numerical ability, logical and verbal reasoning of the children. These do not test the wide variety of mental abilities humans display. According to Gardner, there are at least eight separate intelligences:

- 1) **Verbal-linguistic:** This intelligence is related to words, spoken or written. People with high verbal-linguistic intelligence are good at reading, writing, telling stories and memorizing words along with dates. They are also good in explaining and teaching and are able to persuade others easily. They learn best by reading, taking notes, listening to lectures, and discussion and debate. They learn foreign languages very easily. Careers that suit those with this intelligence include writers, lawyers, philosophers, journalists, politicians, poets, and teachers.
- 2) **Musical:** This intelligence has to do with rhythm, music, and hearing. Those who have a high musical intelligence display great sensitivity to sounds, rhythms, tones, and music. They are able to sing, play musical instruments and compose music. Language skills are typically highly developed in these individuals. Since there is a strong hearing component to this intelligence, people with musical intelligence learn best via listening. They sometimes use songs or rhythms also to learn and memorize information. Careers that suit those with this intelligence include instrumentalists, singers, writers and composers.
- 3) **Spatial intelligence:** This involves the potential to recognize and use the patterns of wide space and areas. Careers that suit persons with this intelligence include navigator, sculptor, geographer, artist, architect etc.

- 4) **Logical-mathematical:** This intelligence deals with logic, abstract thinking, reasoning, and numbers. Those with this intelligence naturally excel in mathematics, chess, computer programming and other logical or numerical activities. They have clear reasoning capabilities, scientific thinking and investigation, and the ability to perform complex calculations. Careers which suit those with this intelligence include scientists, mathematicians, engineers, doctors and economists.
- 5) **Bodily-kinesthetic (movement):** People who have bodily-kinesthetic intelligence are generally good at physical activities such as sports or dance. They enjoy acting or performing, and in general they are good at building and making things. They often learn best by doing something physically, rather than by reading or hearing about it. Careers that suit those with this intelligence include: athletes, dancers, musicians, actors, surgeons, doctors, builders, police officers, and soldiers.
- 6) **Interpersonal (understanding others):** This area has to do with interaction with others. People who have a high interpersonal intelligence tend to be extroverts. They have sensitivity to other people's moods, feelings, temperaments and motivations, and are able to cooperate and work as part of a group. They communicate effectively and empathize easily with others. They learn best by working with others and often enjoy discussion and debate. Careers that suit those with this intelligence include marketing managers, politicians, managers, teachers, and social workers.
- 7) **Intra-personal (understanding self):** This intelligence deals with understanding of self. People with intrapersonal intelligence are introverts. They prefer to work alone. They have a deep understanding of the self; their own feelings and motivations and their strengths and weaknesses. Careers which suit those with this intelligence include philosophers, psychologists, theologians, lawyers, and writers.
- 8) **Naturalist (observing and understanding nature systems):** Those with this intelligence are able to recognize plants and animals, make distinctions in the natural world, understand nature systems and define categories. Careers best suited for individuals with this type of intelligence are farmer, botanist, and ecologist.

According to Gardner, an individual may excel in one or more of these eight areas but have no remarkable abilities in other areas. Hence, a child who masters multiplication easily may not be more intelligent than a child who struggles to do so. The second child may be stronger in another kind of intelligence for example, musical intelligence and therefore s/he may best learn the given material through a different approach or excel in the musical field rather than mathematical field.

Recently Gardner has suggested that there may be three more types of intelligences: 1) moral intelligence, 2) spiritual intelligence and 3) existential intelligence (the ability to answer big questions about the meaning of life).

18.5.3 Use of the Theory of Multiple Intelligences in Education

- 1) Traditionally, schools have emphasized academic achievement (mainly acquiring knowledge from books) and teachers have taught only from books. While many students function well in this environment, some do not. Gardner’s theory argues that teachers should use different methodologies and activities, so that all students are able to understand the lesson taught. Teachers can do this by presenting their lessons in a wide variety of ways such as using music, dance, cooperative learning, art activities, role play, demonstrations, multimedia and field trips. This way, all students would be involved in the learning process and those students who are unable to understand through classroom lectures would benefit from other methods of teaching. Hence, in the schools which follow the ‘theory of multiple intelligence’; teachers use a variety of teaching methods instead of relying on classroom lectures only.
- 2) Moreover, the theory of multiple intelligence focuses on several intelligences such as musical, bodily-kinesthetic, interpersonal and intrapersonal instead of only verbal-linguistic and logical mathematical intelligences. Hence, those schools which follow this theory of multiple intelligence provide opportunities for their students to use and develop all the different intelligences, not just the verbal-linguistic and logical mathematical intelligences. The goal of education is the overall development of the child, rather than just mathematical, verbal and logical capabilities.
- 3) Most importantly, the theory of multiple intelligences enables one to see each child as intelligent and not simply the ones who are good at verbal-linguistic and logical-mathematical intelligences. This has important implications for developing children’s confidence in themselves and self esteem. When children feel good about themselves their learning and performance in all areas will improve.

18.5.4 Limitation of the Theory of Multiple Intelligences

Several psychologists suggest that many of the intelligences that Gardner has suggested are actually talents (e.g. bodily kinesthetic skills and musical ability) or personality traits (interpersonal ability). Other ‘intelligences’ (e.g. verbal linguistic, logico-mathematical and spatial) are not new at all and are tested by the traditional IQ tests.

18.6 SUMMING UP

To summarize, the concept of intelligence has remain debatable over the past century. The most prominent views are:

- ‘Intelligence’ is an umbrella term, which we use to refer not to a single mental process, but rather “a combination of many mental/thinking processes/actions such as learning, understanding, judging, reasoning, planning, problem solving, thinking abstractly, calculating, memorizing, perceiving relationships, storing and retrieving information, classifying,

generalizing, using language fluently and imagination. It also indicates a person's ability to adjust to new situations and adapt effectively to the environment.”

- The definitions of ‘intelligence’ and ‘cognition’ appear similar. However, the term ‘cognition’ is a broader concept and includes all mental activities that we engage in i.e. our thoughts and also all conscious mental activities that inform us about our environment.
- In western cultures, a person is seen as intelligent depending mainly upon (i) the ability of the person for practical problem solving, (ii) verbal ability and (iii) social competence. In Asian and African cultures, while people do define intelligence in terms of the cognitive abilities, they also put emphasis on the social aspects of intelligence.
- Galton, a British scientist, believed that intelligence was inherited and the better the ability of the eyes to see or better the sense of hearing of a person, the higher would be his I.Q. His approach was later abandoned by psychologists.
- Binet and Simon, when commissioned by the French Government, developed the first intelligence test in 1905. It comprised of test items based on mental processes memory, comprehension, vocabulary, imagination etc. The concept of ‘mental age’ was introduced in this test.
- Terman and his colleagues developed the group intelligence tests, ‘alpha’ and ‘beta’ tests, for recruitment purposes in U.S. Army during the World War I.
- In 1916, the Binet-Simon Scale was adapted by Lewis Terman in the Stanford University and then it was renamed “Stanford Binet Test”. The concept of “Intelligence-Quotient” was introduced in this test. It remains a popular test even today.
- There are however several limitations of these I.Q. tests:
 - The IQ tests tend to be “culturally biased”.
 - That the administration of the test is done in a test — like situation is an important limitation.
 - The I.Q. tests do not measure the learning potential of the child.
 - The I.Q. tests do not measure all aspects of intelligence.
- A major controversy among various psychologists over the years has been the question, whether intelligence is a single general mental ability which can be expressed as a single numerical value (as done in these I.Q. tests) or it is a combination of several separate intelligences which cannot be expressed as a single numerical value.
- **Spearman proposed that individuals have both general intelligence and specific abilities and that these two together affect performance on the cognitive tasks.**

- Another prominent view regarding intelligence was that of Raymond Cattell (1963) and John Horn (1998). According to them, there are basically two factors (fluid intelligence and crystallized intelligence) that are part of the general intelligence.
- The theory of multiple intelligence was proposed by Gardner. According to Gardner, the ‘general intelligence’ factor does not encompass all the intellectual abilities of the individual. Also, the I.Q. tests generally access numerical ability, logical and verbal reasoning of the children. Gardner proposed that there are at least eight separate intelligences: verbal-linguistic, musical, spatial, logical-mathematical, bodily-kinesthetic, interpersonal, intrapersonal and naturalist. According to Gardner, an individual may excel in one or more of these eight areas but have no remarkable abilities in others areas. There are several implications of this theory in education. Teachers now use a variety of teaching methods instead of relying on classroom lectures only.

Several psychologists point out the limitation of multiple intelligence theory, that many of the intelligences that Gardner has suggested are actually talents (e.g. bodily kinesthetic skills and musical ability) or personality traits (interpersonal ability) or are not new at all and are tested by the traditional IQ tests (verbal linguistic, logico-mathematical, spatial etc.).

18.7 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress Exercise 1

- 1) ‘**Intelligence**’ is an umbrella term which we use to refer not to a single mental process but rather “a combination of many mental/thinking processes/actions such as learning, understanding, judging, reasoning, planning, problem solving, thinking abstractly, calculating, memorizing, perceiving relationships, storing and retrieving information, classifying, generalizing, using language fluently and imagination. It also indicates a person’s ability to adjust to new situations and adapt effectively to the environment.” Read further in Section 18.2.
- 2) Although the definitions of ‘intelligence’ and ‘cognition’ appear similar, the term ‘intelligence’ is used in the sense of the *abilities shown by the person* for thinking, judging, learning etc; while when we use the term cognition we use it to refer to the *process* of thinking, judging, learning. To use a metaphor from theatre we can say ‘cognition’ is what happens back stage while ‘intelligence’ is what is visible to everyone on stage. Hence the term ‘cognition’ is a broader concept and includes all mental activities that we engage in i.e. our thoughts and also all conscious mental activities that inform us about our environment. Read more in Section 18.2.

Check Your Progress Exercise 2

- 1) a) Galton
b) Cattell
c) Terman

d) David Weschsler

2) Some of the limitations are as follows:

- The IQ tests tend to be “culturally biased”
- The language of the intelligence test is also an important limitation
- The carrying out of the IQ test is done in a test-like situation is also an important limitation of I.Q. test
- Tests do not measure the learning potential of the child
- Tests do not measure all aspects of intelligence.

FURTHER READINGS FOR BLOCK 4

The following are some books that you will find useful for further reading of topics discussed in Block 4.

- 1) Ausubel, D. P. & Sullivan, E. V. (1980). *Theory and Problems of Child Development*. Grune & Stratton Inc.
- 2) Ausubel, D. P. (1978). *Educational Psychology: A Cognitive View*. (2nd Ed). Holt McDougal
- 3) Ausubel, D. P. (2000). *The Acquisition and Retention of Knowledge: A Cognitive View*. Springer Netherlands.
- 4) Berk, L. (2017). *Development through the Lifespan*. (7th Ed). Boston: Pearson.
- 5) Bruner, J. S. & Austin, G. A. (1986). *A Study of Thinking*. Transaction Publishers.
- 6) Bruner, J. S. (1986). *Actual minds, possible worlds*. Harvard University Press.
- 7) Clarke P. (2001). *Teaching & Learning: The Culture of Pedagogy*. New Delhi: Sage publications.
- 8) Gardner, H. E. (2006). *Multiple Intelligences: New Horizons in Theory and Practice*. Perseus Books Group.
- 9) Harris, A. C. (1993). *Child Development*. USA: West Publishing Company.
- 10) Lally, M. and Valentine, S. (2019). *Lifespan Development: A Psychological Perspective*. (2nd Ed). USA. Retrieved from <http://dept.clillinois.edu/psy/LifespanDevelopment.pdf>
- 11) Lefrancois, G. R. (1999). *The Lifespan*. (6th Ed). USA: Wadsworth Pub Co.
- 12) Lightfoot, C., Cole, M., Cole, S. R. (2009). *The Development of Children*. Worth Publishers: USA.
- 13) Miller, P. (2011). *Theories of Developmental Psychology*, USA: Worth Publishers.
- 14) Novak, J. D., & Gowin, D. B. (1984). *Learning how to learn*. New York: Cambridge University Press.
- 15) Rieber, R. W. (ed.). (1999). *The Collected Works of L. S. Vygotsky: Child Psychology*. Springer Science & Business Media.
- 16) Santrock, J. W. (2011). *Child Development: An Introduction*. (13th ed). New York: McGraw-Hill.
- 17) Singh, A. (ed.). (2015). *Foundations of Human Development: A Life Span Approach*. NewDelhi: Orient Blackswan Pvt Ltd.
- 18) Vygotsky, L. S. (1934). *Thought and Language*. The MIT Press.
- 19) Vygotsky, L. S. (1980). *Mind in Society: The Development of Higher Psychological Processes*. Harvard University Press.

