CHAPTER – 2

THEORITICAL

BACKGROUND OF A

PROBLEM
“If researches have taught me anything it is that a man himself can build his future.”

- David Macleyland

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THEORITICAL BACKGROUND OF A PROBLEM

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2.1 Introduction:-

Whatever important achievements that can be achieved by reasoning ability in practical life show importance of reasoning ability. In the age of modern science the reasoning ability has played an important role. Modern technology shows what achievements can reasoning ability attain when it develops. Reasoning ability is a specific ability of human being which differentiates it from birds and animal and shows its importance.

In the subjects of science and technology and mathematics reasoning ability is associated with the principles of mutual relations of several phenomena and relations of different other phenomena are drawn out from these principles. Thus, the knowledge obtained in this way can be useful in medical profession or industries and modern fields. In the subject like mathematics, many phenomena are applied on principles formed on reasoning ability in complex puzzles. Several predictions and principles are developed by reasoning ability in the subject of astronomy also.

Every animal tries to adapt to physical environment to meet its bio-physical needs. Man also uses reasoning ability for his overall development.

But, the fulfillment of bio-physical need is not the only duty of a life, man tries many things for his overall development. An individual adapts with social environment and makes his overall development by reasoning ability.

Looking at the importance of reasoning ability it is essential that it should be included and studies seriously in the field of education.

In short, this chapter discuss about following things:
• Definition of reasoning ability.
• Meaning of reasoning ability.
• Types of reasoning ability.
• Analysis of reasoning ability.
• Errors in reasoning process and intelligence.
• Quotient.

2.2  **Concept of reasoning ability:-**

2.2.1  **Definition of reasoning**: 

(1) Thinking directed by logical laws is reasoning.

(2) **According to Woodworth,**

“Reasoning means mental observation.”

(3) **According to Bernard,**

“Reasoning is a process in which a response becomes stable till it is not reorganized in a new integrated form to clear the problem related facts.”

(4)  **Manner:**

“The power to combine several principal experiences or concepts into new different relationship and then to draw appropriate conclusion and to delete fallacies or improper conceptions.”

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2.3 Meaning of reasoning:

Reasoning is an important sub-type of controlled thinking. Sometimes it becomes difficult to differentiate thinking and reasoning. It means that a good high level thinking and reasoning are closely related to each other. Not only that, both are supplementary to each other. Thus, it can be said that, the thinking directed by the logical laws means reasoning.

Reasoning is a highest type of controlled thinking. Generally when a problem is to be solved or answer of a question is to be found out in a human life or to find the way in difficulty, an individual thinks logically. Thus, reasoning is and aim-oriented thinking. In this type of thinking aim is kept in mind at every stage which means that at every stage the thinking leads to the aim. The state which is uncertain or which does not lead towards aim is dropped out. Thus, when facts and details are collected and coordinated appropriately, one can find out what is right, and logical thinking is used to draw predictions or derive out comes and therefore it can be called a systematic purposeful thinking.

2.4 Process of reasoning:

Reasoning ability can be developed by experiments activity oriented exercises and problem. According to the prominent psychologist Woodworth, “The process of establishing relation or correlation includes influencing of kind, trial, error, analysis and integration of relations. It means to:
(1) To be ready for goal achievement.

(2) To wander to find way for goal achievement.

(3) To recollect things related to goal and previously formed.

(4) To bring recollected things under new controls.

(5) Internal insoluble speech and expression.

2.5 **Analysis of reasoning process:**

Many scientists have analyzed the reasoning process and tried to explain it clearly. Let us understand analyses done by scientists like Gerror and Woodworth one by one:

According to Gerror, “There are probably four steps in a reasoning process:

(1) To understand a problem clearly.

(2) To predict about way to solve a problem.

(3) After prediction, trying out each one by one and find out an appropriate prediction.

(4) To find out whether the prediction found by first three stages is appropriate or not?

Woodworth has also analyzed the reasoning process in four steps.

According to him, the following steps are included in a reasoning process:

(1) To collect details.

(2) To co-ordinate the details.

(3) To find out the hidden meaning of the coordinated details and to predict a solution of a problem based on it.

(4) To test the obtained solutions and make generalization from it.
2.6 Influencing elements of reasoning process*

There are four influencing elements:

(1) In a reasoning process the actual imagination ability of mind plays an important role. With the help of actual reasoning ability a mind attempts many types of experiment. A mind integrates various facts by imagination and moves ahead through trial and error in finding an outcome by using it.

(2) At this stage memory also plays an important role. The memory of what can be the relation of various types of experiences in a puzzle becomes more useful. Besides, the use of knowledge and true facts also play a role in bringing outcome of a puzzle. To bring a successful outcome in every puzzle, wide knowledge and understanding of thoughts become necessary in a reasoning process.

(3) Reasoning process has been described as two parts of a great thought or theatre. It is a part before a theatre where leading thoughts are doing ‘dress rehearsal’ of an outcome of the puzzle and mind is moving ahead in it through trial and error. Whereas, in the latter part many experiences and facts get together try to prove their usage in the front part.

(4) In the last and important act of reasoning the intelligence ability plays an important role. The ‘G’ element in intelligence as described by Spearman finds out immortal thought and immortal relation and plays a leading role in its better practical use.

* TARK SHAstra(1982), GUJarat RAjYA PATHYA Pustak MandAL.
2.7 Types of reasoning:-

(1) Deductive reasoning.

(2) Inductive reasoning.

(3) Analogical reasoning.

(4) Problem solving.

(1) Deductive reasoning:-

Deductive reasoning means to predict by applying universal law to specific situation. This act of drawing is called deductive reasoning. For e.g. a killer is hanged till death or gets life imprisonment. Mostly the killer gets death sentence because of murder. Thus, to try to understand specific phenomena by applying universal law is called deductive reasoning.

(2) Inductive reasoning:-

Inductive reasoning is unlike deductive reasoning. On the basis of various individual based or specific experiences the generalization is done.

For e.g. sometimes we see that a person dies by poisonous snake bite. Thus an universal law is formulated that a person dies a snake bite. This act is inductive reasoning.

(3) Analogical reasoning:-

Analogical reasoning means uniform or similarity when comparison is made between two entities many thing are found to be similar on the basis of which it is
predicted that remaining things in one entity would be found in the other one. This is called analogical reasoning.

For e.g. when specific things are observed in Mars and Earth, it is found that both are planets. Both revolve round the Sun. Now, when it its predicted that Mars will have human population because the Earth has it, this prediction is the analogical reasoning.

(4) **Problem solving:**

Everyone’s life has problems in more or less proportions. Some one simple and some are difficult. The specific or best type of reasoning, which we use to solve a problem has been studied by the experimental research that

(a) Problem solving process is aim oriented.

(b) People try various solutions to solve a problem.

(c) In a problem based new situation the trial and error method is used.

(d) Sometimes a solution is found suddenly and sometimes some past experiences of integrated.

(e) The problem solving includes trial and error at both physical and mental level, analysis of problem to find out an issue and try quickly or slowly till the aim is achieved.

2.8 **Errors in reasoning process:**

(1) Generalization by incomplete or half hearted observations generates reasoning errors.

(2) Many beliefs and maxims lead to reasoning errors.
(3) Certain doubts generate reasoning errors.
(4) Reasoning error occurs due to an attitude of believing things of interest as true.
(5) Even the biased viewpoint generates reasoning error.

2.9 Necessity of reasoning education:-

The basic definition of education is the education of 3Hs that is Head, Heart and Hand.

In today’s modern age the importance of Head has enhanced in “Education with burden”. The Head is forced to rot, to cram or to memorize and the ‘Heart’ has been ignored completely. A student’s overall development means education. The seed of education should be sawn in heart, developed in head or brain and its fruit should be delivered through hand.

Our changing society is entering into the age of technology and only the mathematically-scientifically skilled people are required in it, and therefore the curricula are revised and re-revised frequently. To develop reasoning ability in student and for his self-development the School Based Evaluation (SBE) has been introduced in std.9 and std.10, so that the basic need of providing education through maths-science in terms of quality is fulfilled.

The National Education Policy (1986) lays emphasis on teaching method and reasoning education in schools. Due to lack of reasoning education only the knowledge is tested but the education of adjustment or understanding is not imparted. As a result
students cannot achieve success in science stream. Besides the student cannot perform in scholastic and other competitive exams.

2.10 **Difference between thought process and reasoning process**:

Thinking occurs normally. It is an undesired process, whether we desire or not, the process of thinking continues. It does not require any specific tool, skill or intelligence. On the other hand, a reasoning process occurs when a problem arises.

Thinking is general & reasoning is specific, so the difference between the two is one of degree and not of kind.

2.11 **Reasoning education and its use in technology**:

In this modern age of computer, the reasoning ability is essential to reduce attempts of human power, to enhance work power and to rapidly bring a result. It is useful in,

(1) Daily life

(2) Understanding the world

(3) Science

(4) Engineering studies

(5) Social life

(6) Research

(7) Career field

*GUPTA R (1976), “TEST OF NON-VERBAL REASONING”, RAMESH PUBLISHING HOUSE, NAI SARKAR, DELHI*
(8) Medical field

(9) Specific researches

Keeping the above mentioned things in mind the reasoning education must be given at each stage of school education which will create a revolution in cognitive, emotional and ideological fields.

2.12 Importance of reasoning and intelligence quotient through Mathematics teaching:

Mathematics and Reasoning are always full of life as there is always abundance of a problem.

The credit of the progress of today’s space age goes to today’s scientists. Reasoning and Science develop on a vast arena of Mathematics.

Mathematics develops decision making, reasoning ability, verbal ability, writing work, muscle dexterity. Finger dexterity and many types of mental abilities in a child which can be used to solve many problems of life.

Along with the qualitative characteristics the knowledge of quantitative characteristics of a thing becomes very much necessary.

Today, pedagogy is governed by the knowledge of educational pay gives emphasis on discovery learning by activity. New approaches of mathematics and reasoning are based on the psychological foundation of education*.

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* BRECKERNRIDGE MARIAN E. AND VINCENT E. LEE (1949), “CHILD DEVELOPMENT”, LONDON, W.B. SAUNDRS CO.
The knowledge of mathematics and science is very essential in teaching work in school. The knowledge of both the subjects is based on reasoning ability and intelligence ability of a student. A proficient student in both these subjects is considered intelligent whereas weak student in these subjects is not called proficient. Thus, intelligence is an important aspect in student’s education and it is necessary to know its proportion in a student.

2.13 Concept of Intelligence:

Intelligence is an ability in an individual through which the individual understands others behavior, behaves according and makes necessary changes in a situation, and adapts to the situation. Intelligence quotient is not equal in every individual. For example, Pupils studying in a class in a school do not accept equally the knowledge gives in a situation. The reason is the difference lying in intelligence of human beings. Due to difference in intelligence we have been to able to attain amazing achievement in the field of art, culture, philosophy, science and industries.

According the Hurtle Spurmsar, intelligence is a mental adaption of internal relations with external relations. The attitudes of today’s psychologist have become extensive in terms of intelligence and therefore the task defining intelligence has become difficult. The psychologist of world had met at various times to discuss and share various principles of intelligence. Many arguments were held in favour of and against the intelligence which resulted into a complex attitude of intelligence originating from several originating questions.
“Intelligence in terms of truth is an ability of excellent reaction.” – Thorndike.

“Intelligence means an ability to work effectively in a given environment.” – Buckingham.

“Intelligence means an evidence of easy management of ability of abstract thinking.” – Turman.

From various definitions of intelligence. However it cannot be said that any definition is complete. In every definition various viewpoints are considered. Though every definition is found to be complete in its own field, still it remains incomplete. The ancient scripture like Gita also mentions about intelligence.

There are various ideas about intelligence, such as

(1) Ability for abstract thinking

(2) Ability to adapt to a situation

It became impossible for psychologists to find a practical definition of intelligence and therefore it was defined as – the ability which measured by intelligence test is intelligence.

When intelligence of an individual was measured by various test it was found varying, therefore this definition also become unacceptable. To obtain clear idea about intelligence, it will be better to familiarize with various views about intelligence.

(1) Uni-central view of intelligence - Supreme view.

(2) Multi-central view intelligence - Specific group view.

(3) Un centered view intelligence – Chaotic view.
Spearman had tried to explain previous principles of intelligence. According to him, human being has an ability which operates in every work and moreover there are other secondary abilities which help main ability according to varying works.

Intelligence development depends on mental abilities of an individual. Intelligence is also one of the types of mental ability. But, we can see that intelligent people are not found expert in every field. A topper student in a class hardly succeeds in the subject of art-work. Sometimes a topper fails in the subject of music. Thus, along with intelligence many specific abilities are necessary to succeed in various fields. Like intelligence which is an universal mental ability used in various works, similarly there are other mental abilities in a man which are used while doing limited types of work. These specific abilities are called aptitude.

2.14 IQ Aptitude & Achievement:-

IQ Aptitude and Achievement –

- An ability in latent form to do specific types of work is called intelligence.
- An ability in latent form to do specific types of work is an aptitude which develops through practice-training and when various traits combine in a suitable environment the aptitude is manifested.
- Achievement is an ability to know, experience a work and gain influence by various skills over a specific work. When an individual with aptitude makes frequent and understandable attempts, he attains achievement.
2.15  **Principle of Thirsten:-**

According to Thirsten, there are eight abilities of intelligence. He mentions following elements by defining basic mental abilities:

1. Spatial knowledge ability
2. Perceptual speed ability
3. Number ability
4. Verbal relations
5. Verbal serms
6. Word memories
7. Memory position
8. Induction (Reasoning ability)

But, after that Shartle had discovered eleven abilities by experiments in 1945 in America, Gilford (1987) had opined about having several basic abilities of intelligence.