

## Thinking operations in physics

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**Abstract:** Education is to be fruitful needs to be holistic. This means that the all round development of the children have to be main goals of it. Among many qualities the power to think is important. The subject like Physics enhance the ability of the children to develop logical thinking and reasoning. Man is superior to all other creatures because of his superior ability to think and reason. He is endowed with the faculty of thinking reasoning, hence is called a rational being. These powers of human being have produced a vast domain of culture, science and systems of knowledge. Thinking of man has been an inevitable factor in the welfare of individual and society. It is the main object of education to develop capacity for independent thinking in children.

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### I. Introduction

Education is to bring about all round development of the children through manifold activities which are planned and organized. It has to enhance the ability of the children to think properly which alone leads them achieve required action helping them to attain the desired goal. To be good learners the children are to be good thinkers through the teaching of difference school subjects. This is possible only through encouraging children to think properly which alone leads them achieve required action helping them to attain the desired goal. To be good learners the children are to be good thinkers through the teaching of different school subjects. This is possible only through encouraging children to think when they learn subjects. Physics is one of the subject that needs logical thinking and reasoning. Here is an attempt to the study the thinking operation of children in physics learning.

### II. Nature of thinking

Broadly speaking, thinking includes all forms of cognition. It includes perception, imagination, and memory and concept formation. But in a restricted sense, it is considered as symbolic behavior. C.T.Morgan regards thinking as a sequence of symbolic processes. Munn also regards thinking as a sequential arousal of symbols. Thinking is manipulating the world internally with the aid of symbolic processes. It makes use of memory, imagination and reasoning or problem – solving.

Some times thinking involves transfer. A principle or rule acquired form past experience is applied to solve a new problem. This is called transfer. Thus thinking has the following features.

1. It is essentially a cognitive process.
2. It is goal – oriented. Discovery and invention are the goals of thinking.
3. It is a problem – solving behavior.
4. It involves analysis and synthesis.
5. It involves both hind sight and foresight.
6. It is mental exploration rather than motor exploration.
7. It is a symbolic activity.
8. Thinking is sub vocal talking. It involves inner speech.

Education should promote proper thinking in children to promote proper action which lead to the development of individual and the society. Hence the purpose of teaching in different school subjects is to develop knowledge which leads to thinking.

Physics as a subject requires logical thinking and reasoning. Here is an attempt to measure the thinking operation of student in learning student subjects.

**Sample:** sample selected are 10<sup>th</sup> standard student (N=100) of a school

### III. Objectives of the study

1. To study how students of X std think while answering questions on physics.
2. To study the thinking process of X std students.
3. To study how students of X std develop observation, comparison, application and inferring abilities
4. To study how for our present education system fosters the thinking processes in relation to physics learning.

#### Tool

Tool used is a ready tool on thinking operation in physics which consists of 10 questions each on observation, comparison, application and inference. The questionnaire has figures and graphs which help students to answer them. The tool is prepared by department of studies in Education University of Mysore, Mysore.

#### Data

Data is collected by administering the tool/ questionnaire to the X std student. The questionnaire was administering by giving suitable oral instruction to the student. The subject content of the questions was already learnt by student.

#### Scoring

Scoring was done by using the key. The question consisted of multiple choice questions total score was consisted to study the various components of thinking.

#### Tabulation

Table showing the component wise thinking operations in physics (N=100)

	Observation 10	Comparison 10	Application 10	Inference 10	Total 40
Average	4	3.3	5	4.4	16.7
Percentage	40%	33%	50%	44%	42%

#### Analysis

Out of the four thinking components – observation comparison, application and inference, it is observed from the table that students have not attained complete thinking in any of the components.

#### Observation

Observation is basis for all further thinking. The student have to score high in this component. But it is not so in the selected sample.

#### Comparison

Comparison is based on the ability to observe. In this component also we do not find complete thinking.

When compare to other three components we find that the component of the application has slightly higher percentage (50%) which indicates that the students are good in applying knowledge.

#### Inference

Inference components have been attained by students (44%) only which again are an indication of inappropriate

thinking.

### **Interpretation**

It is clearly understood that the selected sample – students of X std are enable to indicate complete thinking in the four components mentioned above. For subjects like physics thinking and reasoning are important cognitive abilities which help in developing other essential abilities.

### **IV. Conclusion**

It is clearly evident from the study that X std students who have attained the age of around 15 years have not reached complete thinking. It is observed from the responses of the student that students attained differently in different components of thinking. It is also evident that from the study that our education systems do not develop all the needed thinking skill in relation to physics learning. Hence there is need to promote good number of learning activities based on first hand experiences, which alone can help in developing proper thinking in learning physics.

### **V. References**

1. S.K. Chatterjee 'Advanced educational Psychology' books and allied (P) ltd., Calcutta, India 2000.  
Google Search:
2. Physics thinking operation – Tool repaired by DOS in education, Mysore.