



# REVIEW OF RESEARCH

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## CREATING THINKING CLASSROOM FOR ELEMENTARY STUDENTS

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### ABSTRACT:

*Building the habit of mind to think is an endeavour. Many educational psychologists believed that good thinking should be developed in school. This can be achieved by creating a culture of thinking in classroom. Such classroom teach thinking by adopting multiple strategies of good thinking and encouraging practice of thinking processes through effective thinking tools. However the question, whether school should focus on process or content, problem-solving skills or academic information has been debated for years. The present article attempts to attend the major concerns in creating thinking classroom for elementary students.*



**KEYWORDS:** *Thinking Classroom, Elementary school students.*

### INTRODUCTION :

In today's techno fuelled world, rapid change is taking place in our lives. This rapid change requires new adjustments, new habits and new ways of thinking. Students are encouraged to develop those mental habits which will enable them to reflect critically, think creatively, and regulate their behaviour to become life-long learners. These mental habits include those of self-regulated thinking, critical thinking and creative thinking (Marzano et al., 1988).

In this scenario, thinking has been rightly considered to be one of the highest attainments of the human intellect which is needed to be fostered in our classrooms. The same is can be achieved by creating a culture of thinking in classroom (Perkins, Jay, & Tishman ,1993).To face the new challenges of life there is a need to create such opportunities by establishing thinking classroom for our children.

### THINKING

Thinking is essentially a cognitive activity. It is always directed towards achieving some purposes. Thinking is a mental exploration for the purpose of problem solving. The process of thinking always revolves around some problem. In thinking, mental solution of the problem is carried out through symbols, signs or mental images. Thus thinking is a symbolic activity. Thinking may be defined as a pattern of behaviour in which we make use of internal representations (symbols, signs etc.) of things and events for the solution of some specific, purposeful problem.

## TYPES OF THINKING CLASSROOM

Thinking classroom is the concept that has emerged from questions like

What does it mean to think?

How can teachers help students to become better thinkers?

To find answers to the above mentioned questions we need to analyse the ways by which thinking can be taught to school-going children. Some educators advocate that students must be taught how to think and solve problem through separate courses, while other educators assert that students cannot think in abstract, they need some content to think about.

In classroom setup thinking can be taught through specially designed stand alone programme for teaching thinking. Such programmes are designed to teach thinking, separately as a school subject. Thinking can also be taught through infusion approach by incorporating thinking and subject content knowledge together. The main characteristics of each approach are summarized below:

<b>Specially Designed Programme for Thinking</b>	<b>Infusion Approach of Thinking</b>
Thinking is taught as a separate skill.	Thinking is taught as a part of regular Classroom lessons.
Content is not based on school curriculum	Content of school curriculum is an essential part of the thinking course.
Skills and processes are identified for students.	Skills and processes are not identified.
Thinking processes are taught with the help of simple content.	Content knowledge is gained through thinking processes.
Fragmentary; as thinking is separated from context.	Extensive; as thinking is embedded in teaching learning process.
Transfer to new context is questionable.	Transfer is more likely to occur.
Widely used for commercial programmes	More useful for educational setups.

## COMPONENTS OF THINKING CLASSROOM

### Perception

Perception is considered to be the manner in which individuals receive, interpret and translate experiences. How individuals perceive things works to define how they think. Perception tends to provide individuals a significant filtering system.

### Assumptions

Assumptions are central to thinking. They tend to be implied, where individuals are not always conscious of them. Assumptions are not always bad and often rest on the notion that some ideas are obvious. They tend to make individuals comfortable with their present beliefs, shutting out any alternatives.

### Emotion

Trying to leave emotion out of almost anything is impossible as it is part of everything people do and think. Emotions are the number one cause of creating and putting into place thinking and operating barriers, which are continually used as a defence mechanism. Critical thinkers do not ignore or deny emotions but learn to accept and manage them.

### Language

Thinking can't be separated from language since both tend to have three primary purposes: to inform, persuade and explain. Language denotes (designates meanings) and connotes (implies or suggests something), and relies heavily on the use of metaphors. Metaphors are powerful language tools, which are able to influence how individuals think and solve problem. These figures of speech give

great colour and depth to one's language. Metaphors can be short phrases, stories, or even poetic renditions and is a verbal message that listeners can easily interpret and visualize.

### **Argument**

An argument is a claim, which is used to persuade that something is (or is not) true, or should (or should not) be done. An argument contains three basic elements: an issue, one or more reasons or premises, and one or more conclusions. An argument can be either valid or invalid based on its structure and premises. Thereafter, conclusions are reached, which can be either true or false.

The goal of critical thinking is to implement a sound argument, which has both a valid or proper structure and contains true premises. This is where using logic makes all the difference.

### **Fallacy**

Reasoning that doesn't meet the criteria for being a sound argument is considered erroneous, or fallacious. A fallacy comes from incorrect patterns of reasoning. However, it does not always mean that the conclusion is false, but it does underscore the fact that the reasoning used to support it is not: valid, based on true premises, or complete and does not include all necessary relevant information.

### **Logic**

Logic incorporates two methods or types of reasoning: deductive and inductive. Deductive reasoning relies on facts, certainty, syllogisms, validity, truth of premises sound arguments and supported conclusions. Inductive reasoning relies on diverse facts, probability, generalizations, hypotheses, analogies and inductive strength.

## **REFLECTIVE THINKING**

### **Dimensions of Reflective thinking**

The four main dimensions of reflective thinking as suggested by Kember et al . (2000) are Habitual Action, Understanding, Reflection, and Critical Reflection.

#### **Habitual Actions:**

All the actions that are mastered through frequent use and therefore can be performed automatically without much conscious thought are called Habitual Actions. For example day to day activities performed by children.

#### **Understanding:**

At this level students make use of the knowledge, without attempting to appraise that knowledge. For example students can construct meaning from given instructions including oral, written as well as graphic forms without knowing its applicability to varied situations.

#### **Reflection:**

Reflection involves the critique of assumptions about the content or process of problem solving. It require consideration of alternative ways of doing things, for improvement in performance. Betterment is the major consideration of the process of reflection.

#### **Critical Reflection:**

This level is called "premise reflection". The learners become aware of why he/she perceives, thinks, feels, or acts in a particular manner at this level. For example, when a student questions the merit and functional relevance of the need to solve any particular problems, he tries to critically reflect. This questioning leads him to consider the impact of the choices or decisions in future. Kember et al. (2000) stated that reaching this level of reflective thinking is not easy as there is transformation of perspectives to reach this highest level of reflective thinking. Therefore, it is unlikely to occur frequently.

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## CREATIVE THINKING

Creative thinking is divergent thinking which can be accessed on the basis of three main components, flexibility, fluency and originality. It is an ability to think about something in unusual ways and come up with unique solutions to the problem. Creative thinkers think originally, flexibly, divergently and imaginatively.

### Dimensions of creative thinking

Fluency – produce many responses to an open-ended question or problem. In other words fluency is speed and ease with which one comes up with new ideas

Flexibility – generate unconventional ideas and view situations from different perspectives which include ones' ability to see things from different angles.

Originality – produce unique, unusual, or novel responses

Elaboration – adding rich detail to ideas

## CREATING THINKING CLASSROOM

For leading educational changes in the present century we need to focus on creating thinking classroom. The resources needed for such classes are discussed below:

### THINKING SKILLS FOR THINKING CLASSROOM

Thinking skills are the scientific ways and methods used to access and process information. These are mental and physical abilities needed for effective learning. Some of the important skills needed to enhance thinking are described below:

1. Observation
2. Comparison
3. Classification
4. Summarization
5. Interpretation
6. Inference
7. Hypothesizing
8. Predicting
9. Experimenting
10. Evaluation.

#### Observation:

It is an outcome of empirical experiences of the students realized through their senses, which leads to careful watching, noting and perceiving for determining the likeness and differences in things, detectable by any of the senses. When observation is made more specific by comparing some attributes of a system to a standard of reference it is called measurement. Measurement and observation are two forms of the same process skill.

#### Comparison:

During comparing the students exhibit the ability to seek the points of similarities and dissimilarities. What is present and missed by observing the conditions, information and events depending upon the nature of content?

#### Classification:

Classification is the ability to sort things and put them into groups according to some principle i.e., to develop category based on function, size, rank, effect, form or some other criterion.

**Summarization:**

Summarization is the process to evaluate significant and insignificant information, to synthesize the main idea and state in brief or in condensed form the substance of what had been presented.

**Interpretation:**

Interpretation includes description of the given situation and explaining how one has received the meaning. It is to add meaning, to read between the lines, to fill in gaps and to extend on given material within the limits of that material.

**Inference:**

It is the skill in which the students exhibit the ability to make judgments about the non-observable properties of an object or event. It includes relating an observation to something, which was known, and drawing conclusions about what was observed.

**Predicting:**

Prediction is projecting events based upon a body of information. One may project in future, a sort of trend analysis, or may look for historical precedents for current circumstances. By definition, predictions must be testable. This means that predictions are either accepted or rejected based upon observed criteria. If they could not be tested, they are not predictions. The nature of the skill of predicting is to be able to identify a trend in a body of data and thereafter projecting that trend in a way that can be tested.

**Hypothesizing:**

Hypothesizing is the process of intelligently guessing about the probable results of a problem. It is an intrinsic and creative mental process hypothesis is a response or potential solution to a specific problem.

**Experimenting:**

Experimentation is a systematic scientific approach to solving problem which follows five basic steps:

**Problem → Hypothesis → Predictions → Test of predictions → Evaluation of Hypothesis**

In experiment each step emerges from the previous one. The purpose of experimentation is to judge the extent to which the hypothesis is true and to set the standard whereby that judgement is true.

**Evaluation:**

It is the thinking skill in which the students exhibit the ability of justifying point of view based upon sound criteria or principles. It includes judging which means to set up a standard by which one makes a rating or grading on continuum of superiority-inferiority or appropriateness- in appropriateness.

**APPROACHES FOR THINKING CLASSROOM**

Thinking is information processing. We process information in various ways. The most common method to process information is inductive and deductive reasoning. Reasoning is done, along with the thinking through logic. Logic alone cannot suffice; we need strategies/approaches to apply thinking to logic. Some of these approaches are stated in Models of Teaching book by Bruce Joyce and Marshal Weil (1980). Some of these methods are stated below

Concept Attainment Method (CAM) is a specific method which helps to learn concepts with precision. Apart from attaining a particular concept, it acquaints students with the conceptualizing

process. This includes: 1) Understanding the relationship among data such as examples, attributes and concepts. 2) Understanding thinking patterns used to attain the concepts.

Inductive thinking method is about collecting, organizing and manipulating data. Hilda Taba developed series of activities to think inductively about the content to be learned.

Inquiry training method was developed by J. Richard Suchman to learn to organize, reason, build and test theories. J. Schwab used the same method to teach Biology. He advocated the use of biological techniques to classroom learning, practised by the biologists.

Advance organizer method discusses about the most effect ways of presenting verbal material. Concept maps are based on Ausubel's theory of advanced organizer. Concepts mapping technique is widely accepted for learning concepts.

Memory is the base of thinking. J. Lucas developed a method to increase memorizing capacity of students. Meaningful memorization is an essential part of learning process.

Apart from above stated methods of developing thinking, Cognitive growth approach based on the work of J. Piaget on intellectual development, was developed by L. Kohlberg and Irving Siegel. This approach is a learning method that improves intellectual development in general and moral development in particular.

### **VISUAL- VERBAL TOOLS FOR THINKING CLASSROOM**

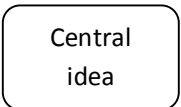
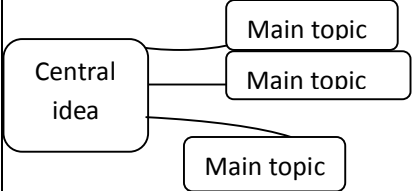
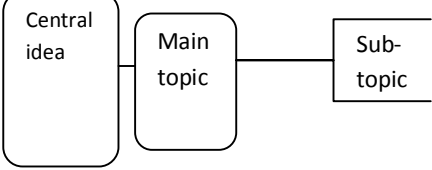
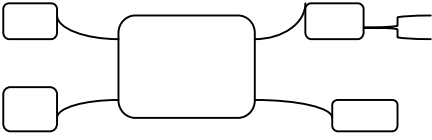
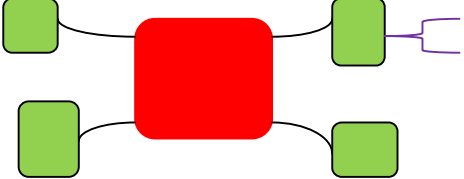
Appropriate organization of the content facilitates better understanding. To help students organize connections and relationship between ideas and concepts. Apart from the basic visual- verbal tools namely, Venn diagrams, flow charts, conceptual diagrams, geographical maps, visual metaphor; there are advanced form of graphic organizers which can be used effectively by teachers and students of the thinking classroom.

The details are as follows-

**Mind Maps:** Tony Buzan (1993) defined mind map as "an expression of radiant thinking and is therefore an expression of human mind. It is a powerful graphic technique which provides a universal key to unlock the potential of the brain". Mind maps facilitate thinking processes executed by both the sides of the brain. Our left brain thinks linearly following direct linkages to related ideas. While right brain observe things as a whole, preferably with colours. Mind maps allow storing, recalling, presenting and brainstorming of ideas at the same time.

#### **The five essential characteristics of a Mind map:**

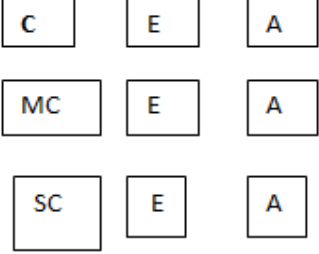
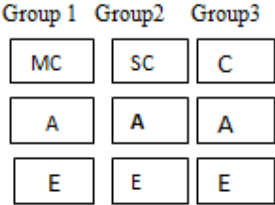
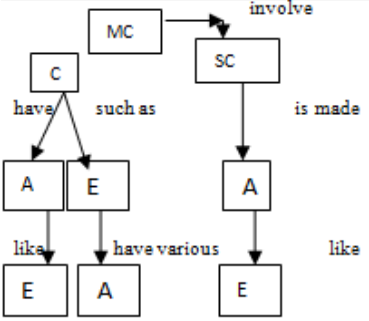
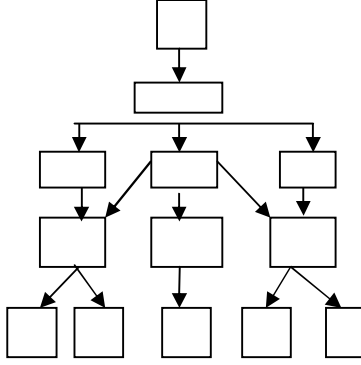
- 1) The main idea, subject or focus is crystallized in a central image.
- 2) The main theme radiate from the central image as 'branches'.
- 3) The branches comprise a key image or key word drawn or printed on its associated line.
- 4) Topics of lesser importance are represented in twigs of the related branch.
- 5) The branches form a connected nodal structure.

STEPS	PROCESS OF CREATING MIND MAP	REPRESENTATION OF MIND MAP
1.	Start with the central or core idea/ concept	
2.	Add branches to central idea to include main topics	
3.	Add more branches to include sub-topics (components)	
4.	Keep on adding components all around the radiant map.	
5.	Add colours or images to identify different levels of the radiant map.	

**Concept Maps:**

Novak and Gowin (1984) describe a concept map as “a schematic device for representing a set of concept meanings embedded in a framework of propositions.” Joseph D. Novak developed concept mapping based on Ausubel’s (1968) assimilation theory of cognitive learning.

Concept maps include concepts, usually enclosed in circles or boxes of some type, and relationships between concepts indicated by a connecting line linking two concepts. Words on the line referred to as linking words or linking phrases, specify the relationship between the two concepts. Concepts are a perceived regularity in events or objects, or records of events or objects, designated by a label. The label for most concepts is a word, although sometimes symbols (such as + or %) and sometimes more than one word are also used. The core element of a concept map is a proposition. Propositions are statements about some object or event in the universe, either naturally occurring or constructed. Propositions contain two or more concepts connected using linking words or phrases to form a meaningful statement. Cross-domain links is an important characteristic of a concept map representing creative leaps on the part of the student.

Phases	Process of creating concept maps	Representation of Concept Map
Brainstorming Phase	Identify the main concept and list all the related concepts, examples, defining attributes and terms.	
Sorting phase	Create groups and subgroups by classifying and categorising the listed terms, concepts and examples	
Linking Phase	Form meaningful propositions by using linking words (phrase or words) and arrow lines.	
Re- thinking Phase	Arrange and rearrange the groups to establish higher order relationship.	

C stands for concept, MC stands for main concept, E stands for example, A stands for attributes, SC for sub concept

**Multiple uses of concept maps**

- Concept mapping tool helped students select, organize, and recall relevant information.
- Students were also able to transfer thinking and learning skills to novel situations and content.
- It facilitates meaningful learning involving assimilation of new concepts and propositions into existing cognitive structure.

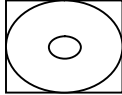
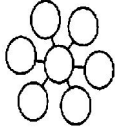
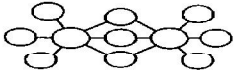
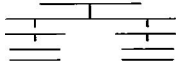
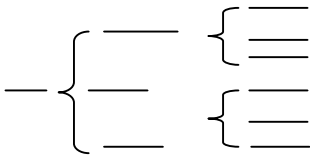



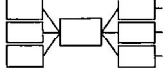
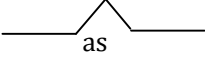
- Motivates students to incorporate new meaning into their prior knowledge rather than simply memorizing concepts, definitions or proportional statements.
- Concept maps facilitates metacognition i.e. individuals’ awareness and ability to monitor their own thinking processes.
- Concept maps are flexible tool that can be used as assessment, instructional, learning and revision tool.
- Concept map allow separating significant content from trivial.
- Concept map allow gaining insight into the way students view a scientific topic.
- Examine the valid understandings and misconceptions students hold.
- Assess the structural complexity of the relationships students depict.

**Thinking Maps:** Thinking Maps were created by Dr. David Hyerle (1988). Thinking Maps are eight visual-verbal learning tools, each based on a fundamental thinking process and used together as a set of tools for showing relationships.

**The consistency and flexibility of each of the Thinking Maps promotes:**

- 1) Knowledge construction leading to meaningful learning
- 2) Student-centred and cooperative learning
- 3) Concept development, reflective thinking
- 4) Creativity
- 5) Clarity of communication
- 6) Continuous cognitive development

THINKING MAPS	THINKING PROCESS	REPRESENTATION OF THINKING MAPS
Circle Map	Defining Context and Perspective	
Bubble Map	Describing Attributes	
Double Map	Contrasting and Comparing	
Tree Map	Classifying	
Brace Map	Whole to Parts	

Flow Map	Sequencing	
Multiflow Map	Cause and Effect	
Bridge Map	Comparing Analogies	

In addition to above eight thinking map, the "metacognitive" frame may be drawn around any of the maps at any time as a "meta-tool" for identifying and sharing one's frame of reference for the information found within one of the Thinking Maps. These frames include personal histories, culture, belief systems, and influences such as peer groups and the media.

### STRATEGIES FOR THINKING CLASSROOM

Teachers should guide students to construct their own thinking by considering following points regarding do's and don'ts of thinking classroom

#### Do's

- Value student's question during the process of learning.
- View students as thinkers with emerging theories about the world.
- Seek student's point of view.
- Seek elaboration of student's point of view.
- Nurture student's intellectual curiosity.
- Argue in a reasoned way rather than through emotions.
- Recognize that there is sometimes more than one good answer to a question and judge which is really the best answer.
- Evaluate and possibly question what other people say rather than immediately accept it as the truth.
- Ask questions and speculate beyond what we know and what is needed to be known to create new ideas and new information.
- Use thinking based question that challenges student's higher order thinking ability.
- Provide appropriate materials and encourage students to make observations, form hypothesis and test solutions.
- Keep up-to- date on the latest developments in thinking.
- Interact with good role model of thinking.
- Monitor student's effective and ineffective problem-solving strategies.
- Give students extensive opportunities to solve real-world problems.
- Involve parents in children's problem solving.

#### Don'ts

- View students' mind as empty vessel, to be filled by the teacher by pouring in information.
- Considering textbooks as the only source of knowledge.
- Seeking correct answer to validate students learning.
- Punishing wrong guesses and rewarding safe and uncreative answers.
- Considering exploration as waste of time and originality as a mistake.

- Restricting students from generating many ideas.
- Not providing environment that stimulate creativity.
- Considering pat answers.
- Discouraging brainstorming sessions.
- Imposing unnecessary restrictions and narrowing of the field of thought process.
- Explaining problem solving methods.

### CHALLENGES OF THINKING CLASSROOM

There are number of factors that act as obstacles in the way of improving thinking of school going children. Some of the major challenges of thinking classroom are discussed below:

#### Incorrect information

During childhood, incorrect information comes from three common sources:

(1) Parental ignorance or preoccupation sometimes prevent them from attending their child's question seriously, which ultimately leads to faulty and incomplete explanation, (2) Incorrect knowledge shared by siblings and peers, (3) unauthoritative and irresponsible mass-media.

#### Limited experience

Lack of critical attitude emerging from limited experience prevents students from judging things accurately. Moreover, underdeveloped reasoning abilities may cause children to associate wrong meanings to their observations.

#### Gullibility

Children coming from authoritarian society learn to believe that anyone older or in authority knows more than they do. As a result, they accept what is said or written without question.

#### Faulty reasoning

Although reasoning ability normally increases with age, lack of training or opportunity to use reasoning ability because of authoritarian training in the home or school often causes children to reason inaccurately.

#### Vivid imagination

Mostly children are not able to keep a check on their imagination. As a result, usually they incorporate their imagination with the developing concept leading to misconception.

#### Unrealistic thinking

Constant exposure to mass media encourages children to think unrealistically about things and create problem in developing habits of appropriate thinking.

#### Misunderstanding of words

Because all concepts sooner or later acquire verbal labels, many children have limited or incorrect understanding of the words that serve as labels. This problem is more commonly found with verbal instead of written labels.

### CONFUSION

Conflicting facts mostly leads to distortion of facts leading to confusing situations.

#### Belief perseverance

Confusion sometimes gives birth to the tendency of holding a belief in the face of contradictory evidence leading to belief perseverance.

### Halo Effect

Halo effect is general impression of a person which influences our perception regarding other person. It is the tendency to view student's particular aspects, either positive or negative on the basis of general impression.

### Fixation

Fixation involves using a prior strategy and failing to look at a problem from a fresh, new perspective. It is of two types:

Functional fixedness is looking at the problem in terms of usual function. Using hard board instead of hammer to nail the hook is a condition depicting unusual use of the item whereas mental set is a type of fixation in which an individual tries to solve a problem in a particular way that has worked in the past.

### Confirmation bias

The tendency to search for and use information that supports our ideas rather than refutes them. People generally feel comfortable when they are working in areas that are familiar to them. There is a fear of the unfamiliar and the unknown, a lack of readiness to think and act differently. This attitude can stand in the way of developing thinking.

### CONCLUSION

From the above discussion it can be concluded that for productive future we need effective and skilful thinkers. To achieve this we need to create thinking classroom with all its resources to develop range of effective working skills. These working skills will help our students function effectively in society, both within and beyond school.

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