Learning: is about searching out meaning and imposing structure.

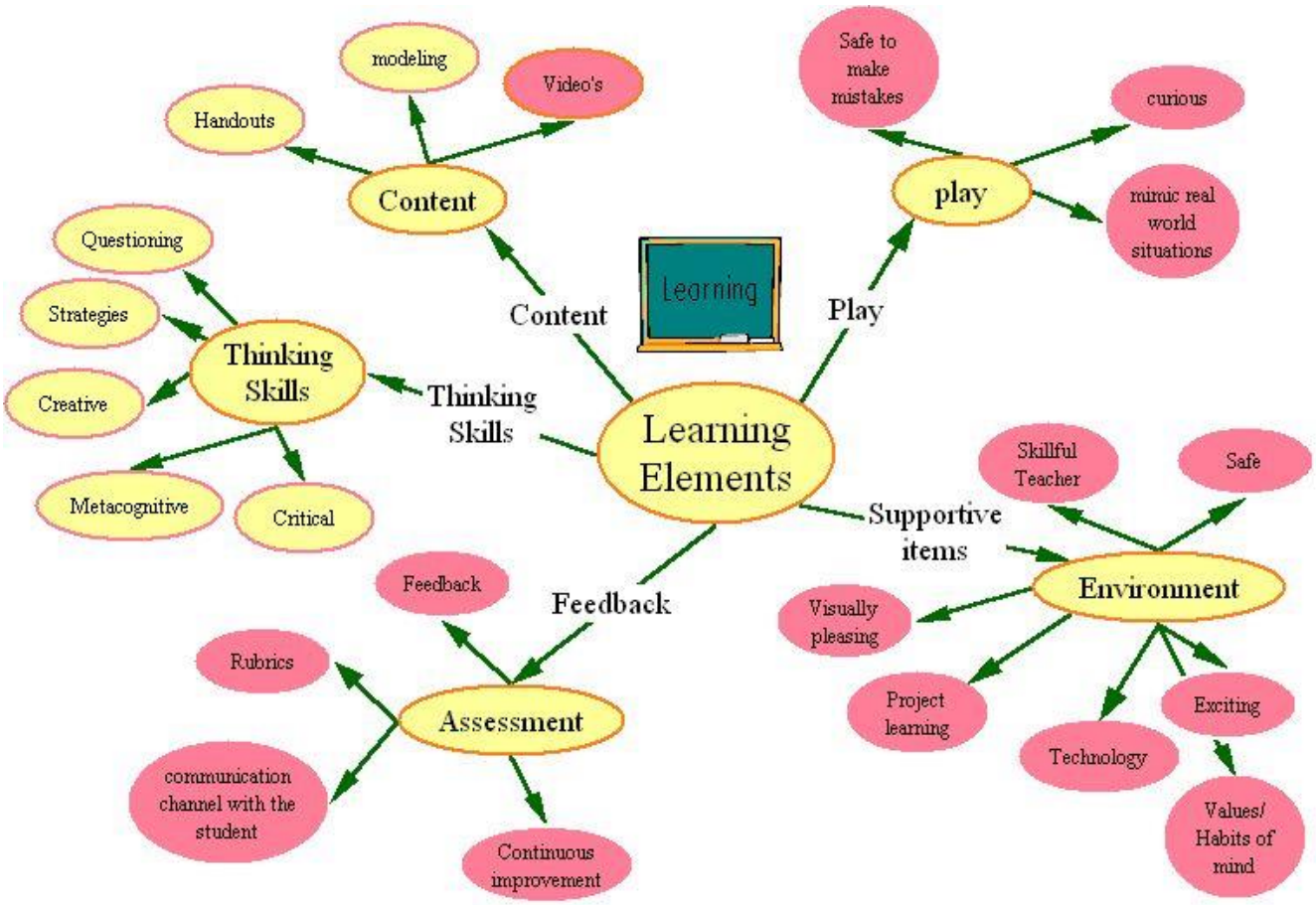


Figure 1.0

Relevance of Learning:

Children locked into classroom discussion are no different than adults locked into boring, irrelevant meetings. If you do not understand how something relates to your goals, you will not care about that thing. If an adult cannot see the relevance of the material covered in a meeting, and has no desire to score political points, he will tune out or drop out. If a child does not understand how knowing the elements of the periodic table will help to address the concerns of his life, and he is not particularly interested in pleasing the teacher, he will do the same.

Infusing thinking skills:

What the team thinking skills refers to is the human capacity to think in conscious ways to achieve certain purposes. Such processes include remembering, questioning, forming concepts, planning, reasoning, imagining, solving problems, making decisions and judgements, translating thoughts into words and so on. Our job is to get our students to think skillfully and to take ownership of their learning. During this time that we interact with them,

we are to help them develop a mirror for them to see what there are doing right and wrong regarding their training. Each student comes with existing knowledge and the teacher helps them connect to the new knowledge.

Teachers Role:

Teachers need to challenge children to think more deeply and more widely and in more systematic and sustained ways. A good teacher makes you think ... even when you don't want to. One way in which you, as a good teacher, can do this is by asking questions that challenge children's thinking. We start with questions that we model for our students. We use Meta-cognitive reflection as part of our questioning.

One thinking routine that we have found to be useful in many settings involves two key questions: "What's going on here?" and "What do you see that makes you say so?" (Tishman, 2002).
We need to focus on modeling for the students the way to ask questions based on the desired outcomes to demonstrate that learning is achieved by getting the students to understand how they gathered the data & use skillful thinking to make a conclusion.
In addition, we need to model the meta-cognition aspects on how we arrived at a learning point. Examples & role playing need to be done to walk through how "did we arrive at that particular point".
The teacher should understand what the expected outcome was and question the students on their achieving this point. In addition, the students should make sure that they complied with the ground rules that were established in the beginning of the exercise.
The goal for the teacher is to teach the students how to learn and acquire knowledge. It is not about teaching but student learning. There is too much data to know it all.

Our process:

- Modeling We need to model what we want our students to act like.
- Coaching: We need to act as the **coach** and facilitator to show students how they can develop their learning style and strategy.
- Fading: We give them lots of practice and then we begin to **fad out** to let the students own their learning.

Thinking Skills:

supports active cognitive processing which makes for better learning. It equips students to go beyond the information given, to deal systematically yet flexibly with problems and situations. Students should adopt creative and critical attitudes and reflect on what we do.

Thinking Components:

Critical Thinking	**Creative Thinking:** Creativity improves pupils' self-esteem, motivation and achievement
• Analyzing the past • What evidence? • What is the author's purpose? • Convergent thinking • Skepticism is a virtue	• Brain storming • Divergent thinking • Exploring your environment & testing many options • Stimulate curiosity • Innovation & entrepreneurship
Meta-cognitive reflection	**Questions … Engaging the student**
• What do I want to understand? • What have I learned? • What do I still need to learn? • Provide feedback for reflection • Regulate ones behavior	• Logical Sequential • Open ended • Listening is the first step in good questioning • Provocative • Engage • Encourage higher order thinking

What makes a question good?

- A good question makes you think.
- A good question is one that does not have an immediate answer, because it requires some thinking, feeling and application to previous knowledge.
- A good question opens doors. It demands more than a yes or no answer.

Creativity;

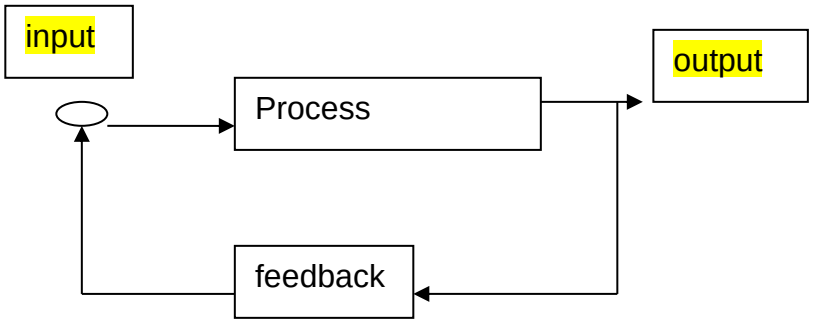
- Setting the environment for creativity to flourish
- The teacher must model the spirit of creativity; Joy, excitement, play, safe structure
- Use of questions to engage students in creative thought.

Learning environment:

Creating an environment that fosters and values thinking. When we honor kids' thinking, they learn that their thinking matters. Students and teachers feel free to take risks as learners when they know their thoughts, ideas and opinions will be treated respectfully by others. The room arrangement mirrors the focus on learning and thinking with meeting spaces for small groups, a comfortable spot where the large group can gather, and desks or tables in clusters to promote conversation and collaborative work.

- Set Values
- Focus on vocabulary
- Make thinking visible
- Don't look to blame
- Incremental learning
- Learning from mistakes **Solving problems :** watching the teacher under stressful situation; making mistakes, being calm
- Learning is collaborative
- Excitement/enthusiasm leads to fun & play, Child like, not childish. Show enthusiasm for challenges, puzzles, complex tasks
- Wait 30 sec before answering
- Let students know how to succeed (rubrics)
- Value Differences: accepting one another point of view

Learning organization: an organization that is continually expanding its capacity to create its future. We need to get beyond "problem solving" and change the thinking that produces the problems in the first place. We tend to focus on the parts rather than seeing the whole, and to fail to see organization as a dynamic process. Thus, the argument runs, a better appreciation of systems will lead to more appropriate action.
Source -*Peter Senge*



Input: complete, count, define, describe, identify, list, match, observe, recite
Process: evaluate, judge, predict, infer, analyze, reason, explain, distinguish
Output: complete, imagine, predict,
Feedback: speculate, if/then, forecast, idealize,

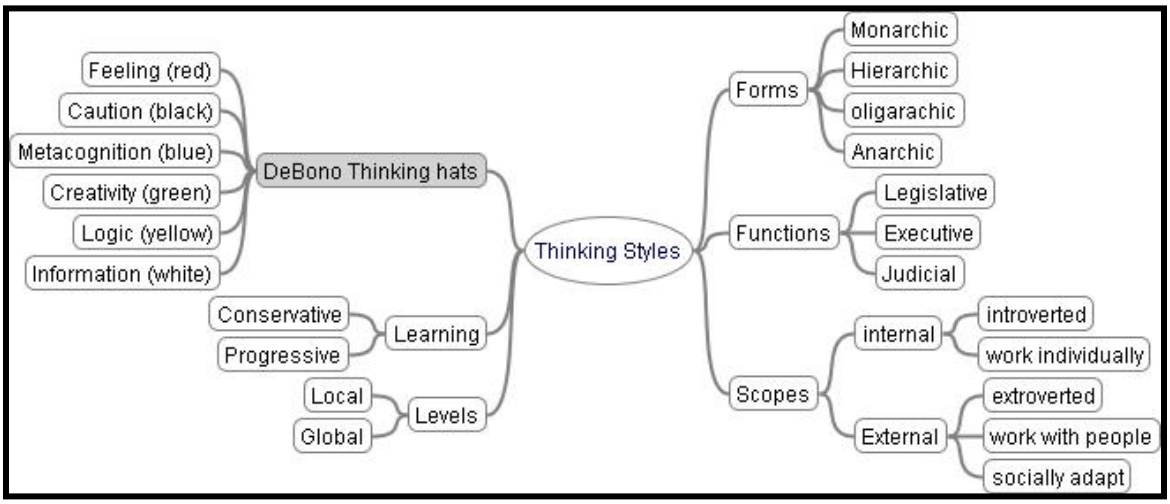
System approach to thinking skill learning

From seeing just the parts to seeing the whole

hypothesize, judge	

Thinking Styles:

Each of us has different thinking styles we operate with. In order to explain different concepts we need to understand where we are starting from. Sternberg (1997) emphasizes that there is not a person with only one style, but a profile of styles. In other words, one person could adopt a variety and combination of them. We as educators have our own styles that we operate with.



Strategies:

It is important to give learners the time and opportunity to talk about thinking processes, to make their own thought processes more explicit, to reflect on their strategies and thus gain more self-control. Acquiring and using meta-cognitive skills has emerged as a power idea for promoting a thinking skills curriculum … Carol McGuinness (1999)

Create your thinking strategies:

- Look to make your approach more efficient.
- Look at issues from a system view with inputs, outputs, processes and feedback.
- Think of strategies in "gathering, organizing, analyzing and making conclusions.

- Break problems into small chunks and study them well.
- Begin with the things that are simplest to understand and move to the more complex.
- Never to accept anything as true that you do not clearly know.
- Be complete in both your work and reviews that nothing is omitted.

Descartes, Discourse on Methods

Basic PreK Skills Needed:

Comparing, Classifying, Sequencing, Predicting Source - Pamela B. Tanguay

There are skills that can be developed even in young children in order to improve their visual processing and thinking skills, which include the ability to:

- Categorize (group like or related information together)
- Compare and contrast (how are things different, and how are they alike)
- Observe (watch carefully, study)
- Identify patterns (a sequence in which things occur)
- Look for cause and effect (does something specific happen as a result of a particular act or activity)
- Generalize (apply what is learned to a new or different situation)
- Problem solve (determine appropriate method to overcome a difficulty)

Routines for use in Stories:

I SEE / I THINK / I WONDER

A routine for exploring literature to find design challenges and other interesting things

1. **What do you think you know about this item in the story?**
2. **What questions or puzzles do you have?**
3. **What does the Literature or topic make you want to explore?**

WHAT KIND OF THINKING DOES THIS ROUTINE ENCOURAGE?

This routine helps student make careful observations and thoughtful interpretations; to stimulate curiosity and set the stage for inquiry.

WHEN AND WHERE CAN IT BE USED?

Use this routine when you want students to think carefully about why changes are occurring that could lead to a design challenge for a character in the story.

WHAT ARE SOME TIPS FOR STARTING AND USING THIS ROUTINE?

Ask students to make an observation about this portion of the story and follow up with what they think might be going on or what they think this observation might be. Encourage students to back up their interpretation with reasons. Ask the students to think about what this makes them wonder about what's happening at this point in the story.

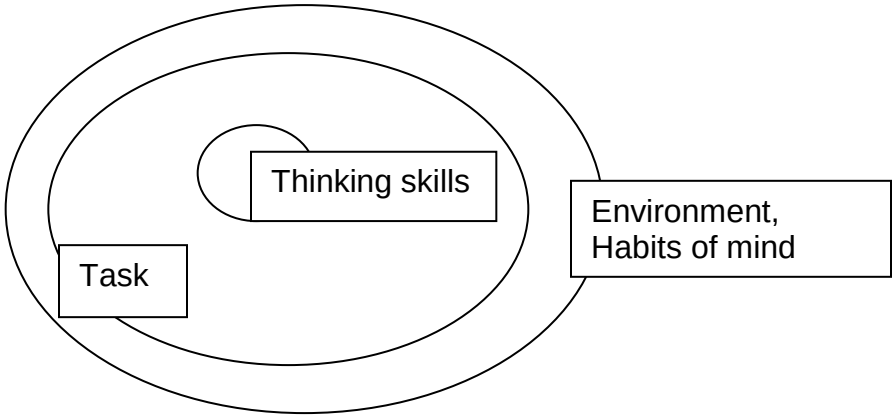
The routine works best when a student responds by using the three stems together at the same time, i.e., "*I see…, I think…, I wonder ….* " However, you may find that students begin by using one stem at a time, and that you need to scaffold each response with a follow up question for the next stem. The routine works well in a group discussion but in some cases you may want to have students carry out the routine individually on paper or in their heads before sharing them out as a class. Student responses to the routine can be written down and recorded so that a class chart of observations, interpretations and wonderings are listed for all to see and return to during the course of study.

1. What do you see?
2. What do you think about that?
3. What does it make you wonder?

This routine is adapted from the Visible Thinking project, Harvard Project Zero.

If the design challenges don't jump out to you or your class, a good why to start is by using the 5 W's (Who, When, Where, What, Why) plus How in question format to begin. As an example you can ask yourself the following questions:

What do we know about the story?
Where does it take place?
When does it take place?
What things happen in the story?
Who are the main characters friends and how do they help the character?

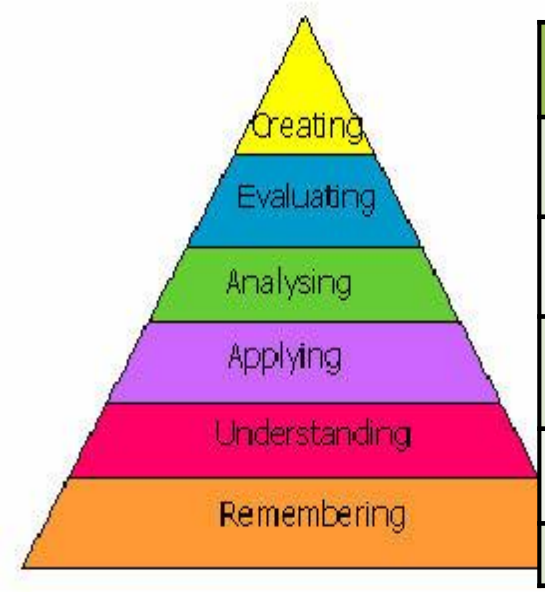


2). **Thinking Skills:**
The next larger circle represents instruction in specific skills of thinking. Although thinking is a complex phenomenon, researchers and specialists agree that such skills are the basic tools of effective thinking. Being successful in school, at work and in life depends upon acquiring and performing certain basic, discrete cognitive functions such as recalling, comparing, classifying, inferring, generalizing, evaluating, experimenting and analyzing. While these capacities are innate, their refinement, procedures and applications may need to be brought to the conscious level through direct instruction. According to such theorists and researchers as Barry Beyer, 4 Edward de Bono 5 and Reuven Feuerstein,6 continuing systematic instruction in explicit skills using procedures over an extended period of time is especially effective in helping children of all abilities to develop increased proficiency in carrying out these skills. 7

3). **Performance on Tasks Requiring Skillful Thinking:**
Such cognitive skills, however, are seldom performed in isolation. Few people simply go out and observe, compare or synthesize. Thinking skills are employed within a larger context in response to some challenging condition: dichotomies, anomalies, dilemmas, ambiguities, paradoxes, conflicts, enigmas or obstacles, for which resolutions are not immediately apparent. To resolve such tasks, larger mental operations comprising clusters of numerous cognitive sub-skills are employed over time. The skills are combined and organized into strategies and sequences that we refer to as problem solving, decision-making, creating or generating knowledge. For example, decision making may require observing accurately, gathering data from diverse sources, inferring causality, comparing and contrasting alternative choices, and predicting consequences. 8 9 10

Bloom revised higher order thinking skills:

Revised Bloom Taxonomy



How can we design a product or process that creates value for society or the character?
What elements are important to solving the problem?
Which design challenge best fits our needs?
How can we connect these design challenges (problems) to science and math
Can you find any problems or issues that some of the characters are having?
What happens in the story?