



# Thinking Skills

## PreK to 5<sup>th</sup> Grade

Thinking does not occur spontaneously but must be evoked by problems and questions or by some perplexity; confusion or doubt  
... John Dewey

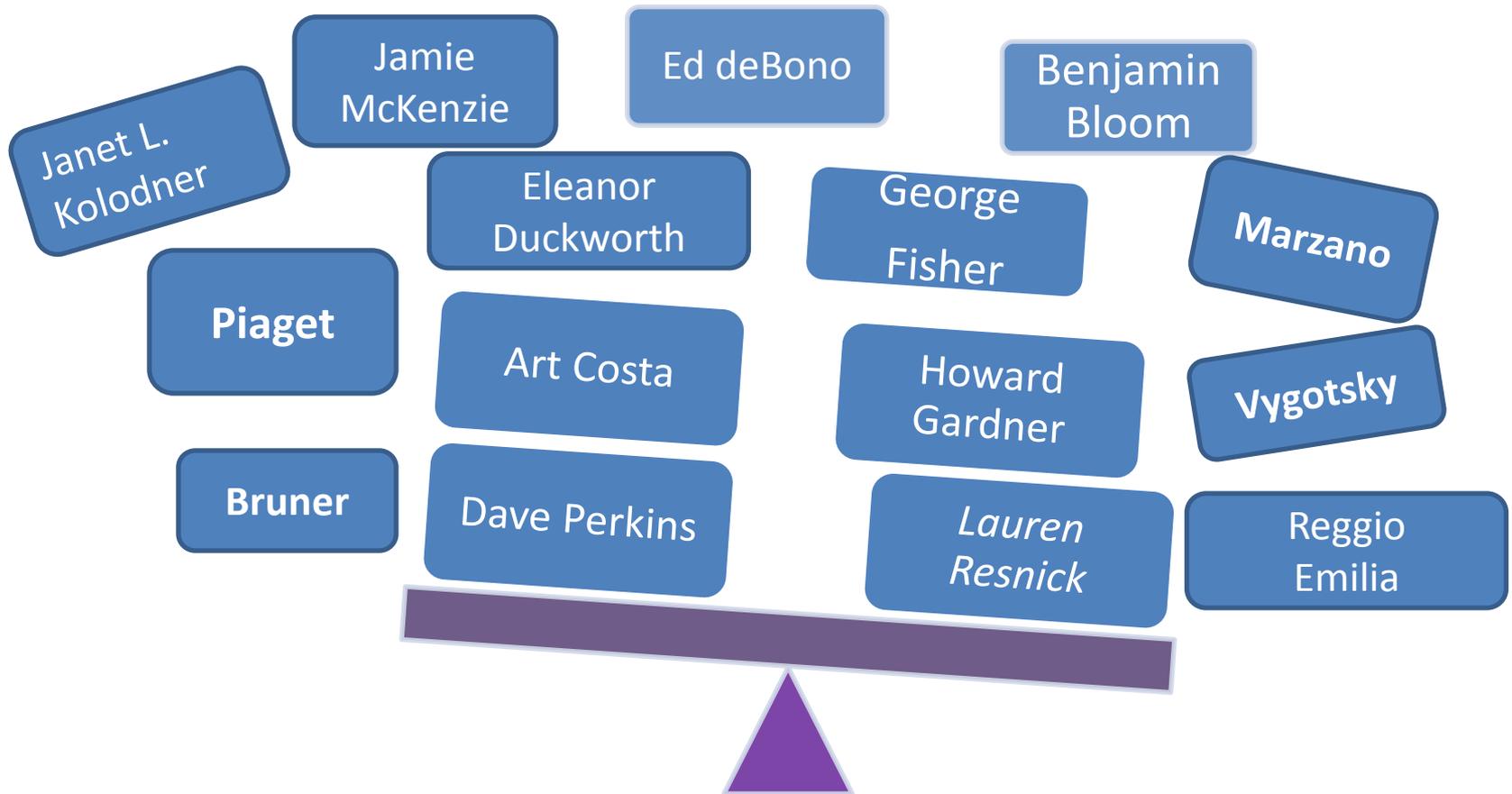
Thinking Classroom ...  
connected to the Common Core

# Cultures of Thinking

**Description: Thinking Skills needs to take a more formal place in the learning process. It should not be hidden away but be a co-equal of each of the core subjects learning.**

This workshop will offer hands-on opportunities for educators to explore practical ways to use thinking skills within the core curriculum to help make an exciting learning environment for the students. Students will learn the core elements that make up the tools of thinking skills and how to apply them in the core curriculum of language arts, social studies/history, science, engineering and mathematics. This will be done in an interdisciplinary project learning environment.

# Who help put this together?



**Lots of thoughts on this subject!**

# Research Questions for PreK to 5<sup>th</sup> grade teachers

Can we create short thinking skills learning modules for teachers that model learning styles for students?

How can we influence and develop the classroom culture to make **thinking** a more central aspect of classroom

What must be done to have teachers collaborate at schools to create an engaging interdisciplinary learning environment that uses Thinking Skills?

# Objective

Develop short lesson plans for educators to provide thinking skill exercises for their students.

Get students to be comfortable in using thinking skills in all parts of their lessons. Culture of thinking.

Model for educators how thinking skills can be used as part of an Interdisciplinary learning environment.

# Who does not supports Thinking?

## Part of a School Culture

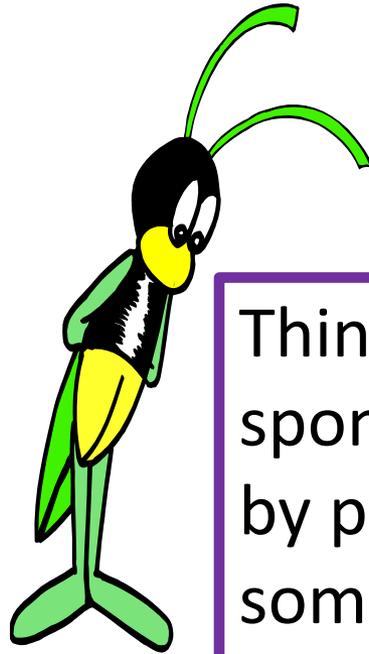
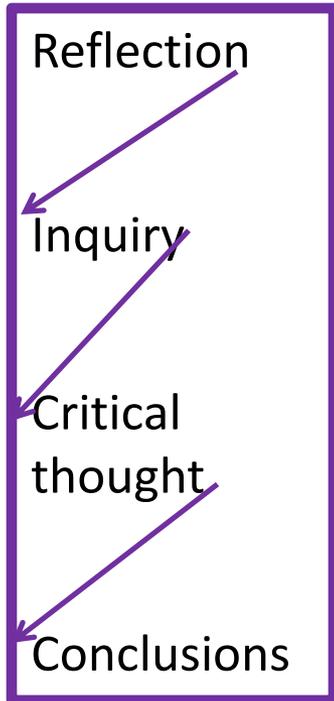
- We must surround students with thinking, not one-off activity that we engage in on special occasions but day-in, day-out, ordinariness of the classroom.
- Thinking must be part for all students, not the exclusive domain of the gifted or advanced students.

# Learning outcomes (what you want your students to know and be able to do as a result of the PD):

- 1) Define a variety of higher order thinking skills.
- 2) Determine what learning situations are best for using specific kinds of thinking skills.
- 3) Provide frequent opportunities for students to practice a variety of higher order thinking skills (teacher-designed exercises, lessons designed with thinking skills imbedded).
- 4) Evaluate published curriculum for the inclusion of appropriate thinking skills. Add components to enhance and broaden thinking skills.
- 5) Develop an increased awareness of the inclusion of a variety of higher order thinking skills across the curriculum.

Sequence  
chaining of events

# Thinking



Thinking does not occur spontaneously but must be evoked by problems and questions or by some perplexity; confusion or doubt  
... John Dewey

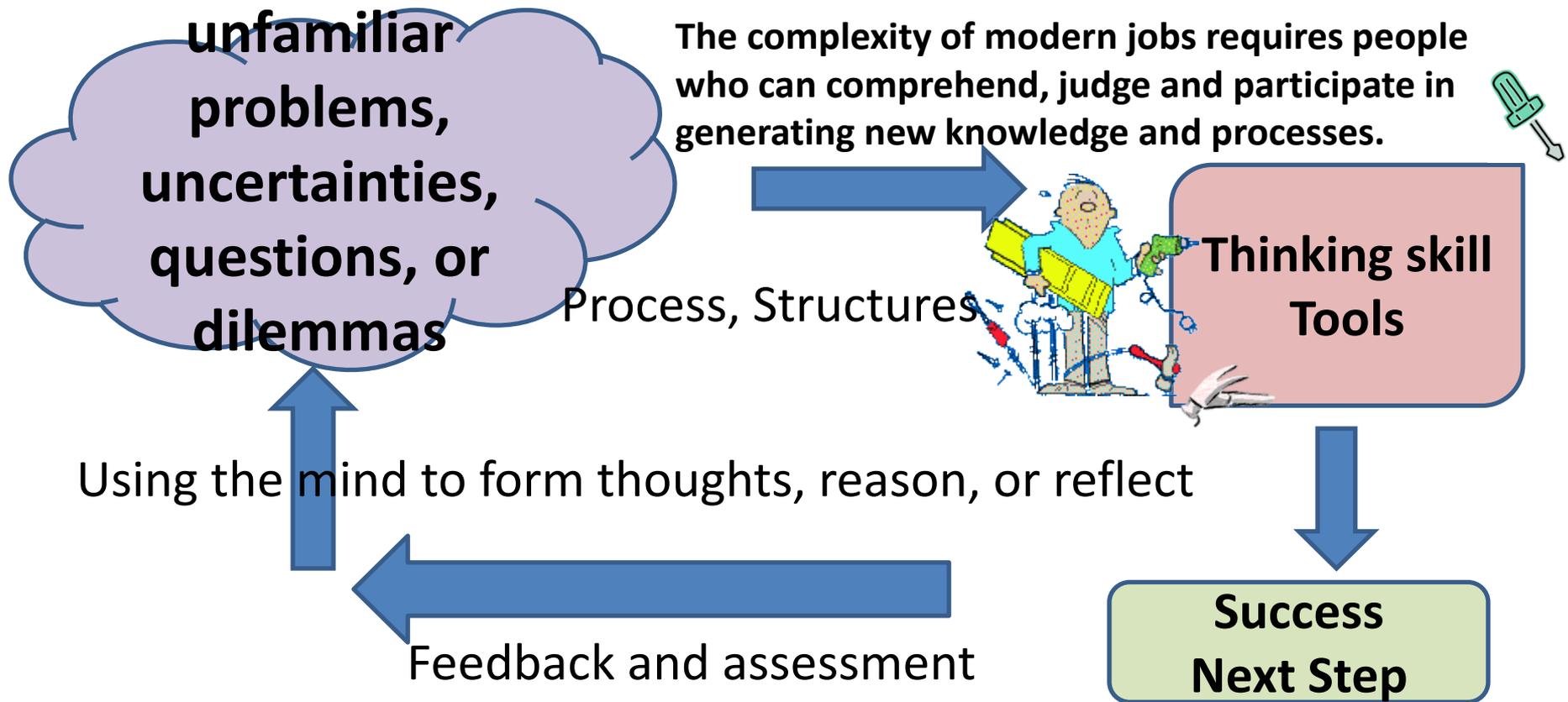
*Discuss what Bugs you and how you will solve or fix it.*

# What is thinking?

What the term refers to is the human capacity to think in conscious ways to achieve certain purposes. *Use of the mind to form thoughts, to reason, to reflect.*

remembering	questioning
forming concepts	planning
reasoning	imagining
solving problems	making decisions
judgments	system thinking

translating thoughts into actions.



**Successful applications** of these skills result in **explanations, decisions, performances, and products** that are valid within the context of available knowledge and experience, and promote continued growth in higher order thinking, as well as other intellectual skills.

# Thought can:

straighten out entanglements	clear obscurities
resolve confusion	unify disparities
answer questions	define problems
solve problems	reach goals
guide inferences	shape predictions
form judgments	support decisions
end controversies	

The students needs to be able to:

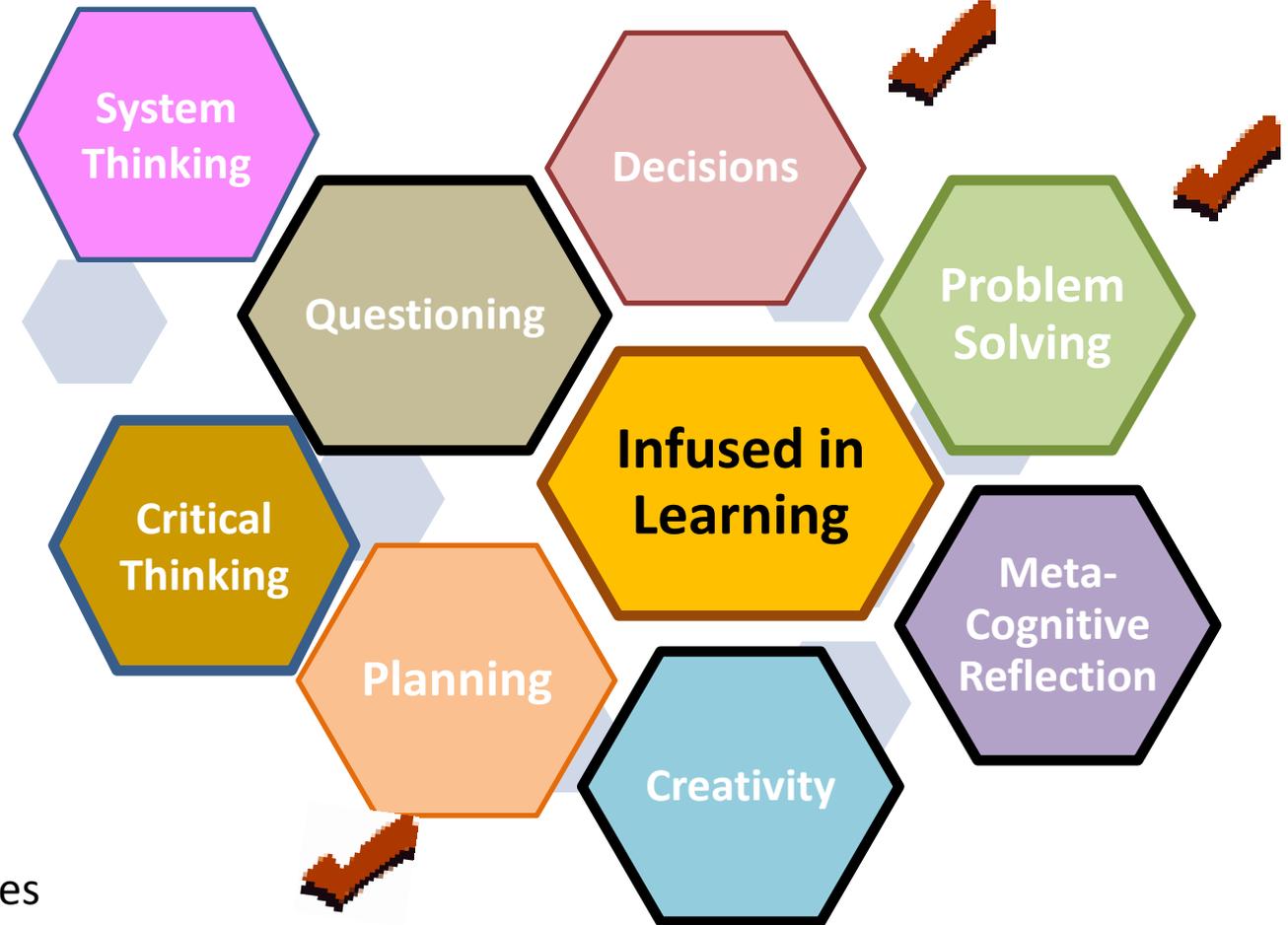
- Articulate the skill
- Be-able to use it in the right situation
- Be-able to use different skills together

A thinking skill is a practical ability to think in ways that are judged to be more or less effective or skilled. They are the habits of intelligent behavior learned through practice and knowledge of the skill. ... George Fisher

An analogy would be the carpenter using the right tool for constructing a house and what tools are needed at different work times.

# What are the 21<sup>st</sup> century learning modules to improve our Thinking Skills?

- Observing
- Looking below the surface
- Building explanation
- Synthesizing
- Visualizing
- Reasoning with evidence
- Posing questions
- Exploring multiple perspectives



Multi-modules

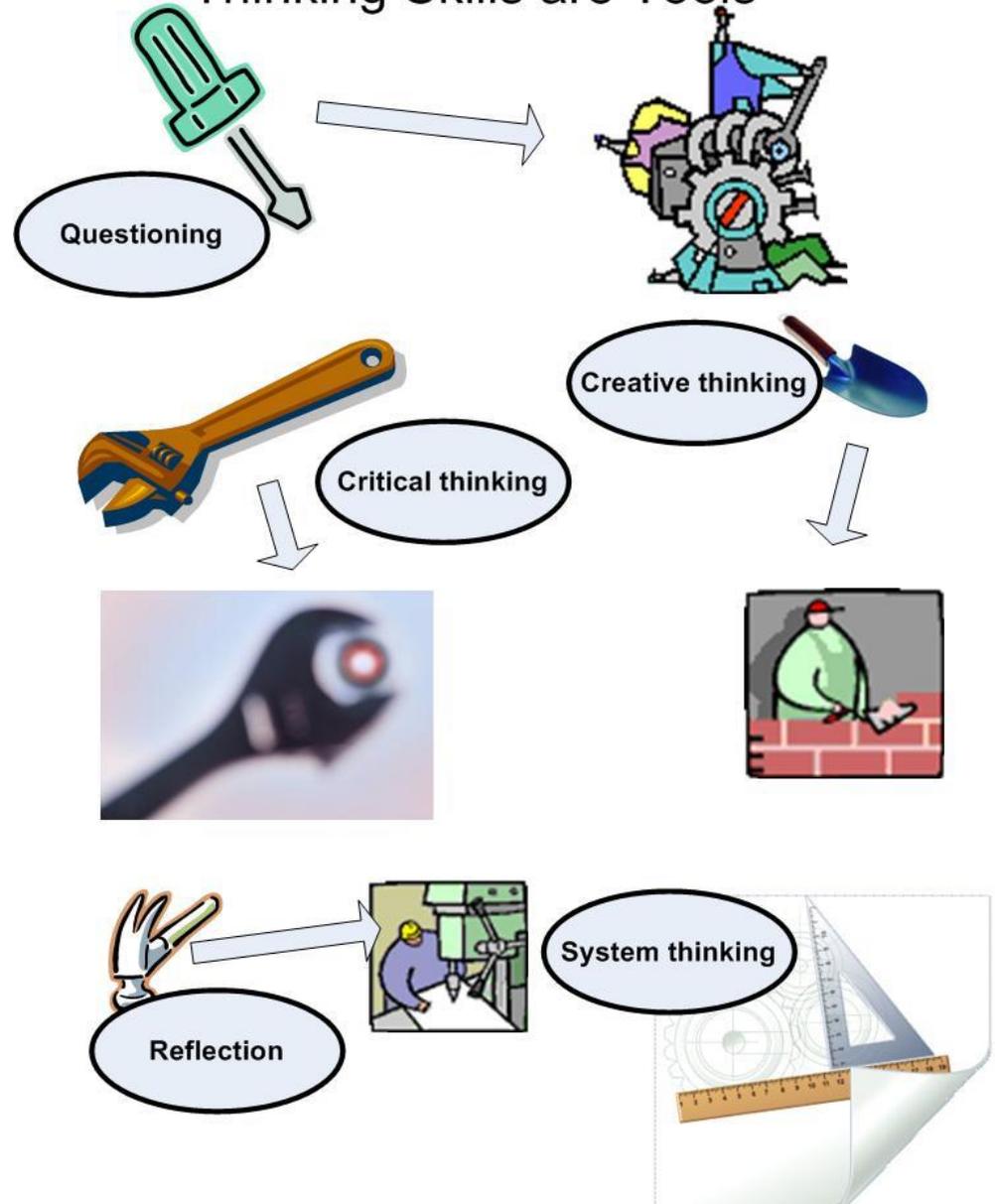
**Problem Solving** = Questioning, Creative and Critical thinking and Reflection.

We need to start thinking that the thinking skills can be looked upon as tools for use in learning:

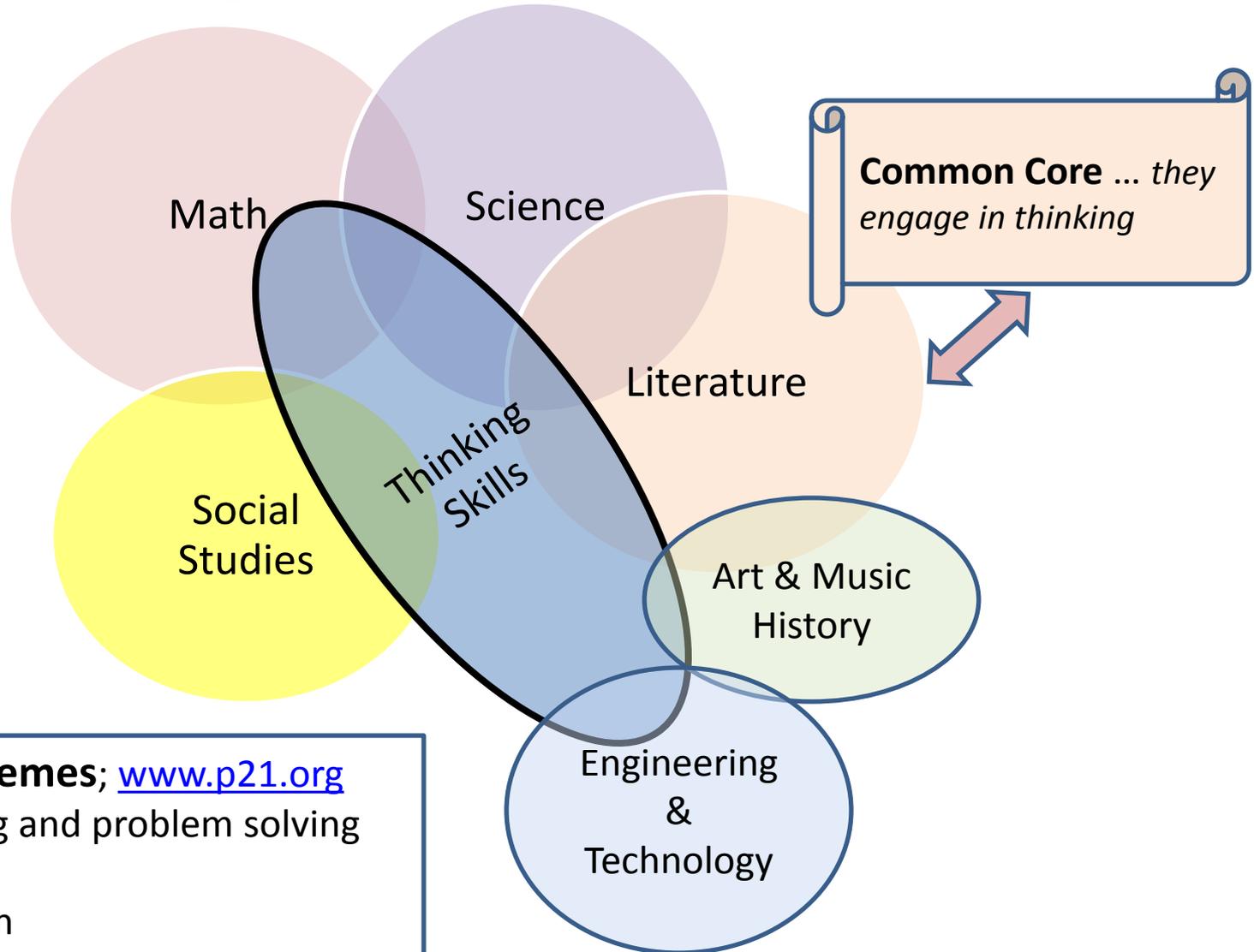
1. You need the right tool for the operation
2. Tools are used together to complete an operation

We need to give our students the tools to search and find knowledge to follow their interests.

## Thinking Skills are Tools



# Infusing thinking skills into:



## 21st Century Themes; [www.p21.org](http://www.p21.org)

- Critical thinking and problem solving
- Collaboration
- Communication
- Creativity and innovation

## Knowledge has three lines of access

- Perceptual ... looks for connection
- Action ... What we have done before
- Conceptual ... an idea, words, Manipulative

Ask questions in all disciplines of the students. ***“What is happening when we view the moon for a month”***

Instead of explaining to the students, then, **I ask them to explain what they think and why.**

- Much of the learning is in the explaining
- The students themselves determine what it is they want to understand
- people come to depend on themselves: they are the judge of what they know and believe
- Students recognize the powerful experience of having their ideas taken seriously
- Students learn an enormous amount from each other

***... Eleanor Duckworth.***

# Have the students create their own learning

- Learning is about searching out meaning and imposing structure.
- Pick out some key thinking items ( ie; perception, system thinking, evaluation, critical and creative thinking)
- Build an outline to help search for meaning

## Overview task

What concepts do I bring?

Definition

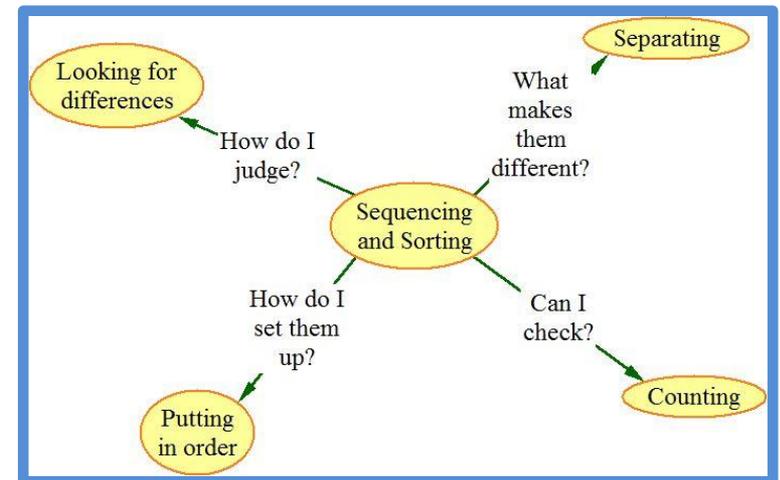
Mind map of where it fits

Research finding

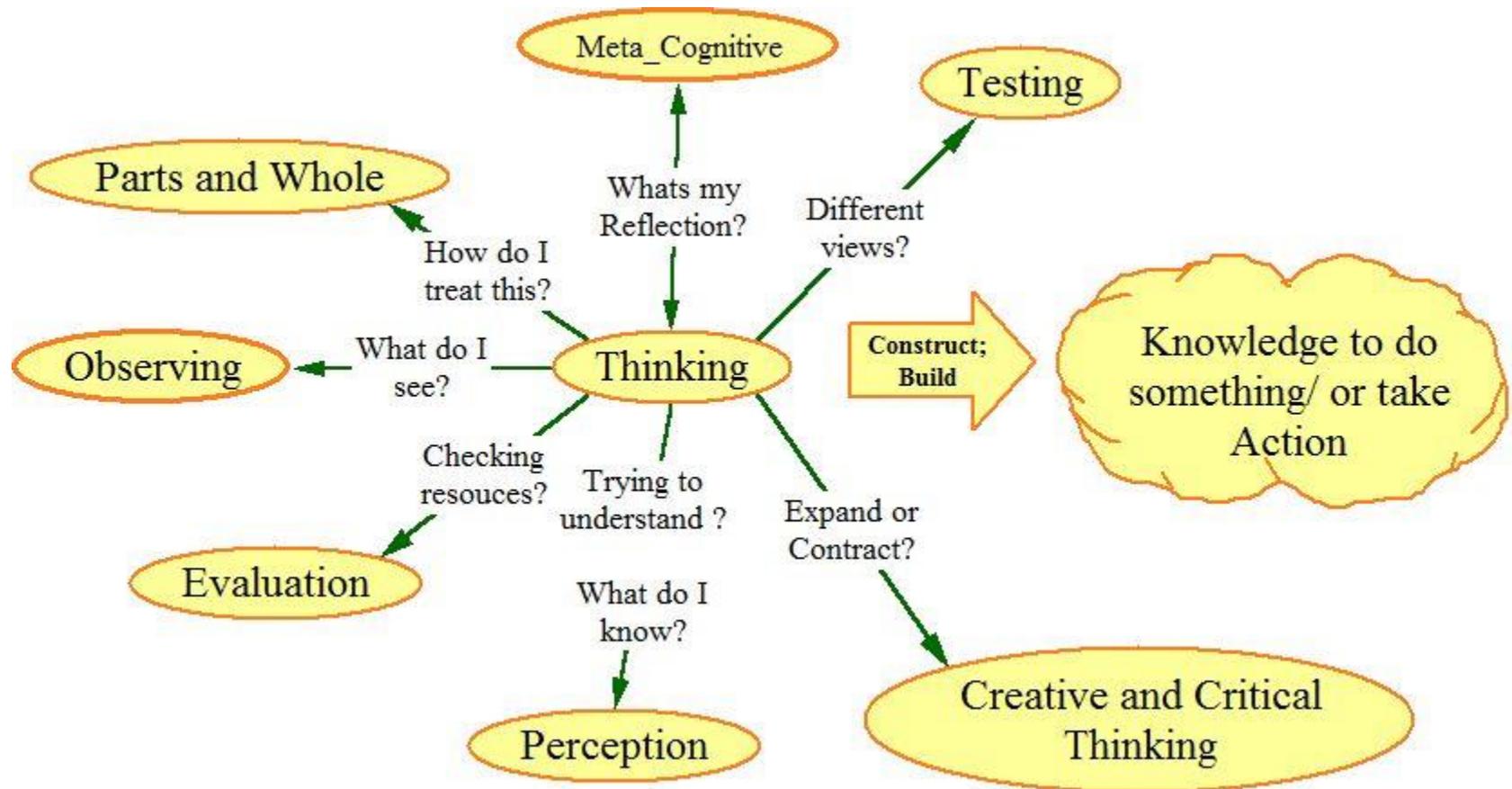
People or organizations connected

What tools can we create to make this known to the whole class?

What did we do right, could improve?



Use of the mind to form thoughts, to reason, to reflect.



# Key Skills needed to Judge

If thinking skills are the mental capacities we use to investigate the world, to solve problems and make judgments then to identify every such skill would be to enumerate all the capacities of the human mind and the list would be endless.

Many researchers have attempted to identify the key skills in human thinking, and the most famous of these is Bloom's Taxonomy

# Bloom's Taxonomy

## Higher Order thinking



### Elements

#### **Creating**

Generating new ideas, products, or ways of viewing things

#### **Evaluating**

Justifying a decision or course of action

#### **Analysing**

Breaking information into parts to explore understandings and relationships

#### **Applying**

Using information in another familiar situation

#### **Understanding**

Explaining ideas or concepts

#### **Remembering**

Recalling information

# Bloom Questions

Elements	Verbs	Major thinking skill
<b>Creating</b> Generating new ideas, products, or ways of viewing things	Designing, constructing, planning, producing, inventing.	Creative thinking Questioning, Critical thinking
<b>Evaluating</b> Justifying a decision or course of action	Checking, hypothesising, critiquing, experimenting, judging	Critical thinking Decision Questioning
<b>Analysing</b> Breaking information into parts to explore understandings and relationships	Comparing, organising, deconstructing, interrogating, finding	Critical thinking System thinking
<b>Applying</b> Using information in another familiar situation	Implementing, carrying out, using, executing	Planning Collaboration Questioning
<b>Understanding</b> Explaining ideas or concepts	Interpreting, summarising, paraphrasing, classifying, explaining	Reflecting Collaboration Critical thinking
<b>Remembering</b> Recalling information	Recognising, listing, describing, retrieving, naming, finding	System thinking Planning

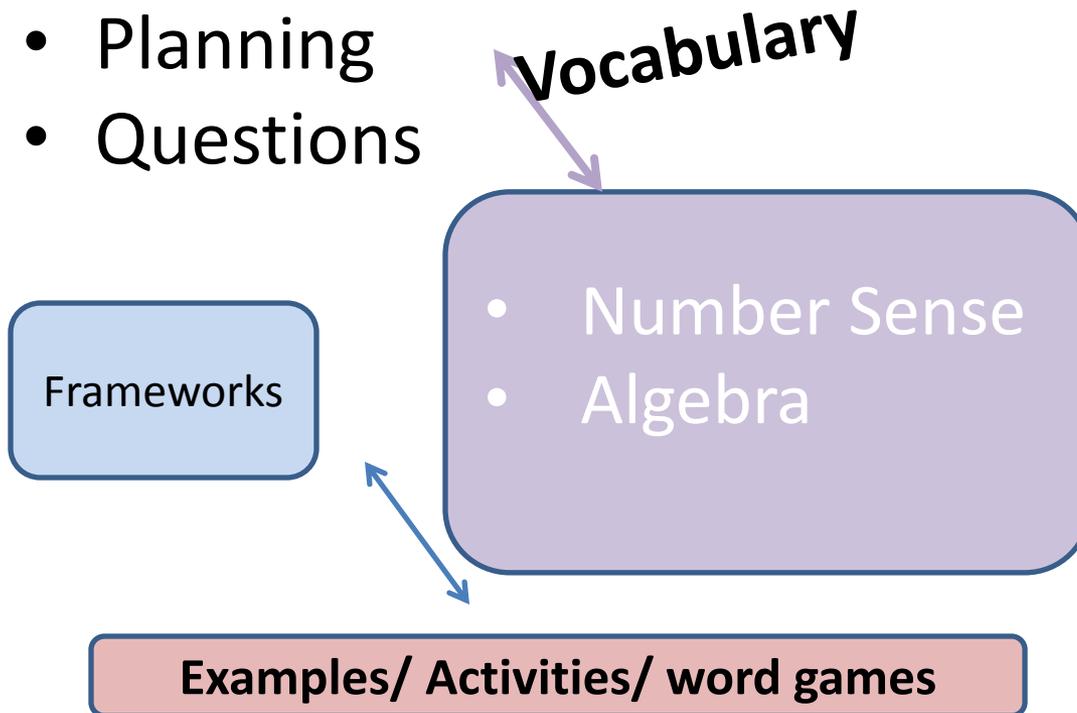
See separate Module discussion ...

*Building off of the math and literacy Common Core*

Examples

# Math

- Problem Solving Process
- System Thinking
- Reflection
- Planning
- Questions



## Understand the problem

List the key facts given and questions to be answered

Devise a plan or strategy such as:

- Look for a pattern
- Look at the basic foundation
- Draw a picture or diagram

Solve the problem

Check the results and examine the solution

## Do a mental test of the solution

Communicate the complete solution with proper units and labels

Look back to reflect on the process and other strategies that could have been used

Look ahead to think about how the problem could be extended

Mathematical Problem Solving Modified from George Polya's four step method in his book How to Solve it, by Pat Davidson

# Math-2

**In math, students might also dig deeper and reveal their knowledge of problem solving by asking:**

- How does this problem relate to other I've solved already?
- Can I break this problem into parts?
- How can I represent this problem/  
these are excellent problem solving script questions that can be embed within our normal approach in all subjects.

**Suspend reaching  
a conclusion**

# Science

- Critical thinking
- Questioning
- Problem solving
- Creativity
- Reflection
- Planning
- Decision
- System Thinking

**Vocabulary**



Life Science  
Earth and Space  
Chemistry & Physics  
Engineering

Frameworks

<b>Define the situation</b>
<b>Develop a Hypothesis</b>
The precise formulation of the Problem. <b>Create a model</b>
<b>Design an Experiment</b>
<b>Perform the experiment</b>
Observation of the relevant facts
The use of previous knowledge
Formulation of the explanatory hypothesis
Deductions from the hypothesis
<b>Form a Conclusion</b>
Testing... <b>Argument</b>
Conclusion: <b>Write a report</b>

**Examples/ Activities/ word games**

# Science page 2

Science exemplifies the attitude of a high degree of caution, exactness and thoroughness. ... john Dewey



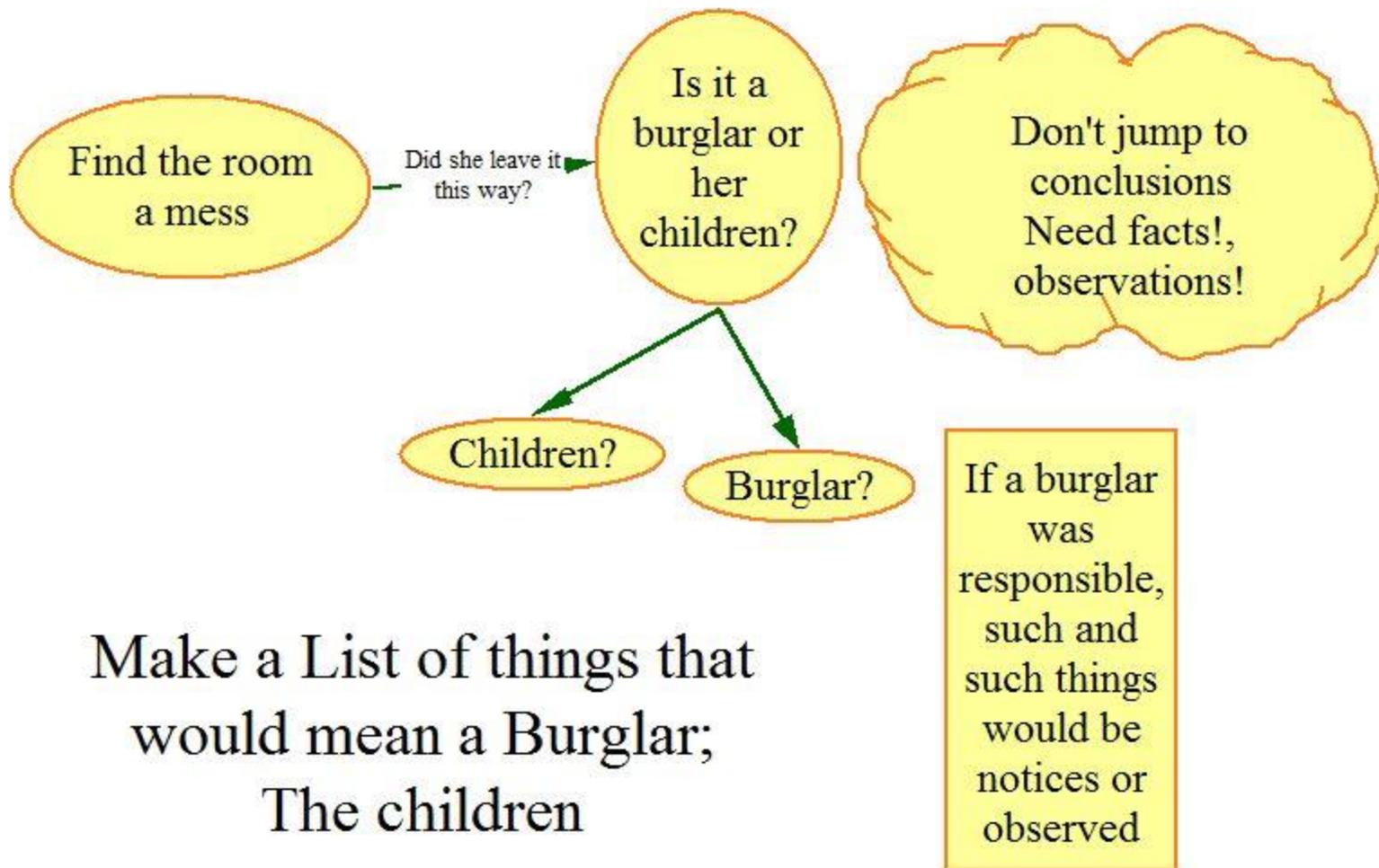
Iterative

## Deductive proof

- Developing
- Applying
- Testing

### Exercise:

A woman who has left her rooms finds them upon return in a state of confusion, articles being scattered at random. What does her thought process go through?



# Literature

- Critical thinking
- Questioning
- Problem solving
- Creativity
- Reflection
- Planning
- Decision
- System thinking

**Vocabulary**



Reading  
Writing  
Communication

Frameworks

Examples/ Activities/ Word games

**What's the author's purpose?**

What key questions or problems does the author raise?

What information, data and evidence does the author present

What key concepts guide the author's reasoning?

What key conclusion is the author coming to? Are they justified?

What is the primary assumption?

What is the author's viewpoint?

What are the implications of the author's reasoning?

# Social Studies

- Critical thinking
- Questioning
- Problem solving
- Creativity
- Reflection
- Planning
- Decision
- System thinking

**Vocabulary**



History  
Current events  
Environmental

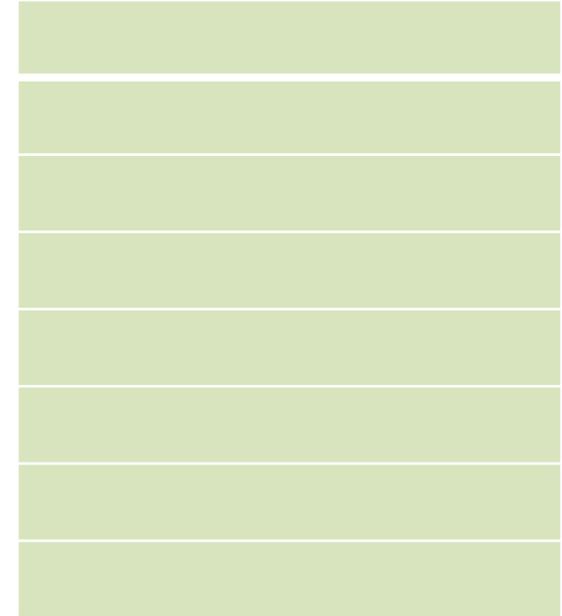
Frameworks

Examples

# Art History/ Music

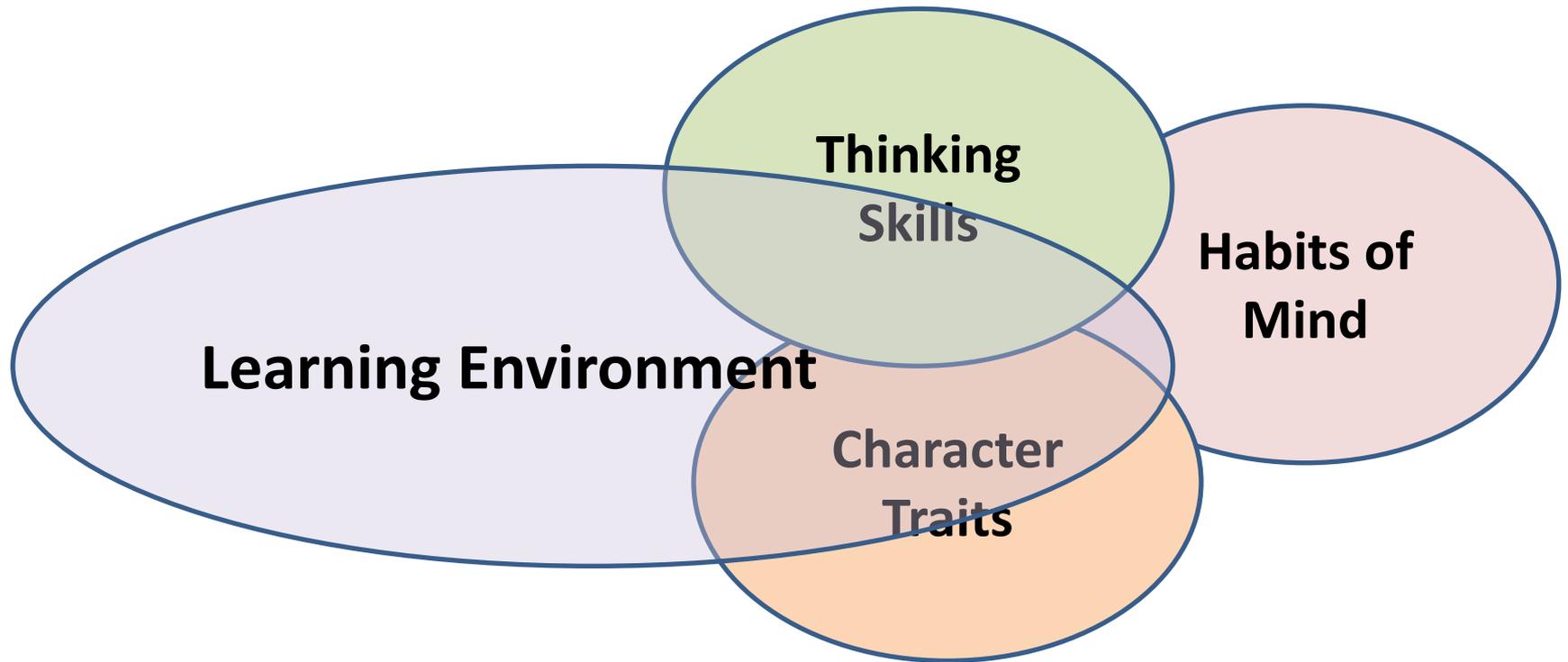
- Critical thinking
- Questioning
- Problem solving
- Creativity
- Reflection
- Planning
- Decision
- System thinking

**Vocabulary**



# Learning Culture

Vygotsky's idea: "Children grow into the intellectual life around them"



Supportive attributes needed to  
achieve the learning of thinking skills

# What does Industry want?

From Joyce Plotkin .. [www.masoftware.org](http://www.masoftware.org) , 2006

- Critical thinking skills
- Good oral/written communications skills
- Global orientation
- Flexibility
- Ability to think outside the box
- Ability to lead/work in teams
- Ability to function at Internet speed
- Ability to take risks
- Ability to be lifelong learners
- Business, management, entrepreneurial studies

How do we fit?

Create a Learning Culture and  
Environment

# Learning outcomes

- awareness of themselves as thinkers and learners
- practice strategies for effective thinking
- develop the habits of intelligent behavior that are needed for lifelong learning

provides students opportunities to develop **character traits** such as **personal responsibility, self-respect, respect for others and trustworthiness**—all essential to overcoming social skills deficits.

... *George Rogers*

# Teachers need to provide:

- *cognitive challenge* , challenging children's thinking from the earliest years
- *collaborative learning* , extending thinking through working with others
- *metacognitive discussion* , reviewing what they think and how they learn

# Learning Environment .. Finish education system

- Must support the pupil's growth and learning.
- Must be physically, psychologically and socially safe and support the pupil's health.
- Objective is to increase pupil's curiosity and motivation to learn and to promote their activeness, self-direction, and creativity by offering interesting challenges and problems.
- Guide pupils in setting their own objectives and evaluating their own actions.
- Give the chance to participate in the creation and development of their own learning environment

# How does discourse change and shift as classrooms become centers of Learning?

- Teachers motives focus more on understanding students' thinking and making it visible.
- Elaboration becomes the norm in classrooms as teachers probe students' responses and students come to expect to provide justification.
- Both teachers' and students' questions become more authentic.
- Percentage of students participating increases and their contributions show more depth.
- "Wait time" increases.
- Student-to-student interactions and discussion become more common.

# How?

- Teachers and School officials
- Students on-board, part of thinking culture
- Lots of inquiry based projects, Tools, Process and structure
- Technology... Games, Clickers
- Community involvement

Reflection

End  
Thank you

