Panel 4: Key Intrapersonal Competencies

:

Self-regulation of Science Learning in the Context of Educational Game Creation: A Study of Middle School Students with Learning Disabilities

National Academies of Sciences, Engineering, and Medicine
Symposium on Assessing Hard-to-Measure Cognitive, Intrapersonal and Interpersonal Competencies

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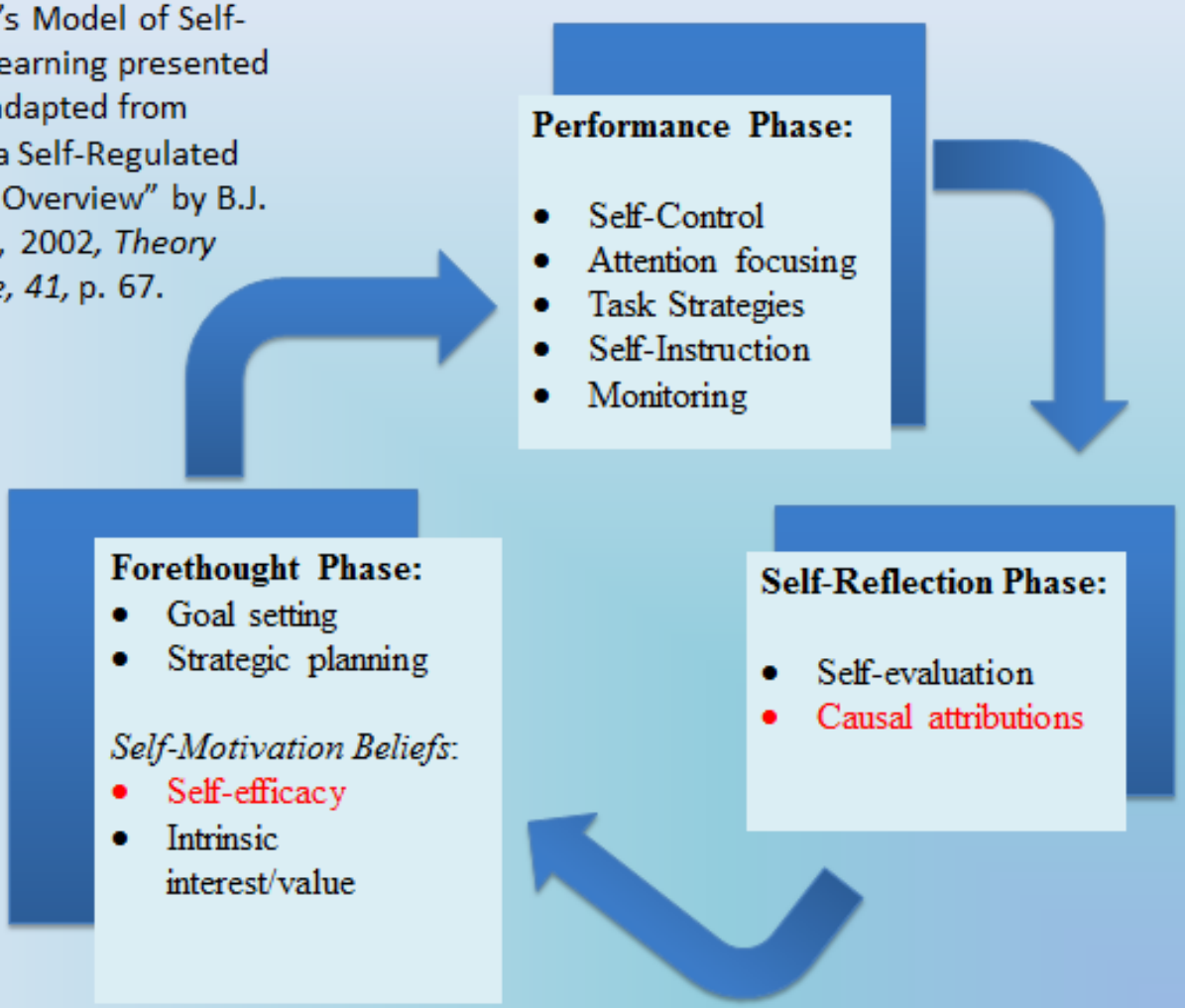
Self-Regulated Learning Framework (Social Cognitive Theory)

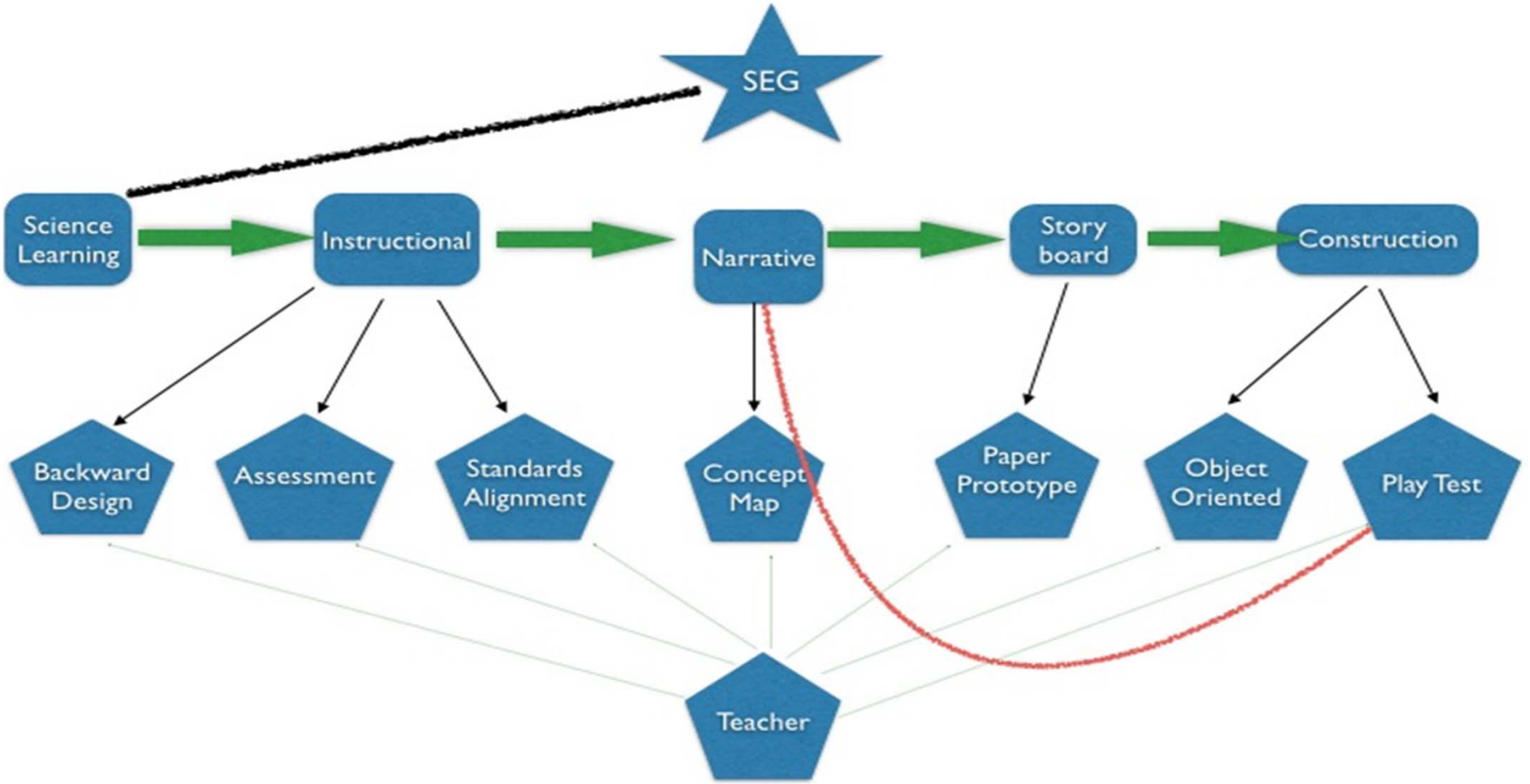
Zimmerman's Model of Self-Regulated Learning presented below and adapted from "Becoming a Self-Regulated Learner: An Overview" by B.J. Zimmerman, 2002, *Theory Into Practice, 41*, p. 67.



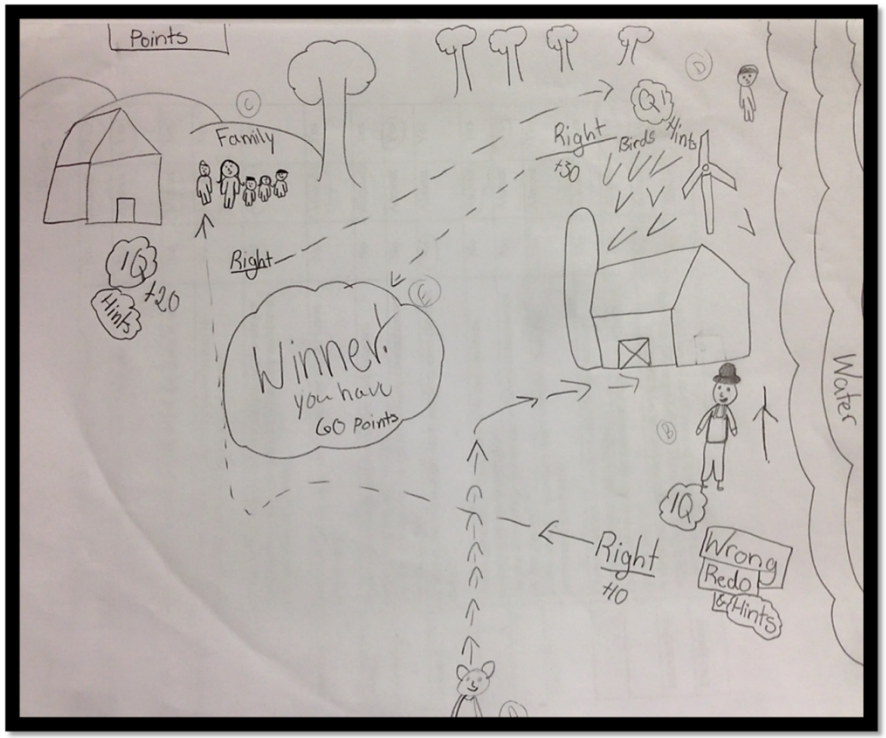
Participant Selection: Students with Learning Disabilities

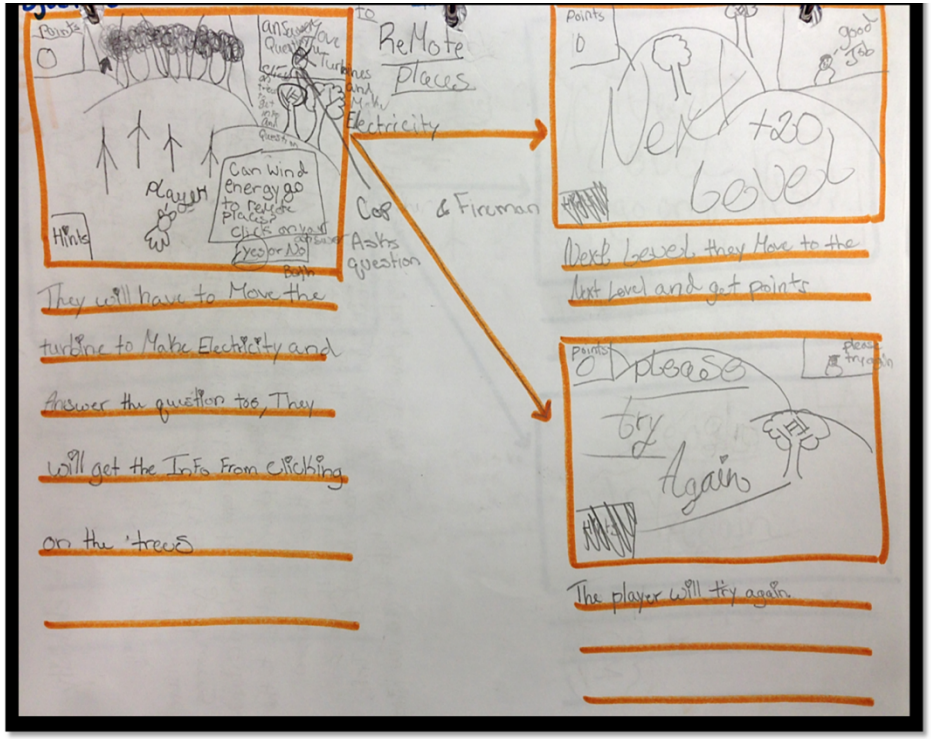
- Although **highly capable**, limited numbers of students with learning disabilities (LD) are pursuing careers in STEM fields, even though many work-related opportunities are available to these individuals (Basham & Marino, 2013).
- Because acquisition, retention, and demonstration of science knowledge can pose multiple challenges for students with LD, **researchers have noted a critical need to foster students' ability to self-regulate their own learning** (e.g., Brigham, Scruggs, & Mastropieri, 2011).
- **Students with LD** are an ideal sample for this type of work precisely because
  - these students characteristically **display inappropriate causal attributions for learning** (e.g., Baird, Scott, Dearing, Hamill, 2009; Tabassam & Grainger, 2001), and
  - **these attributions are malleable** (e.g., Berkeley, Mastropieri, & Scruggs, 2011; Miranda, Villaescusa, & Vidal-Abarca, 1997).

Learning Context: Creation of Serious Education Games



From: Annetta (2008)


Points
Family
Right
+30
Birds
Hints
Right
IQ
+20
Hints
Winner
you have
60 Points
Water
Right
+10
IQ
Wrong
Redo
&Hints


Points
Remote
Places
Electricity
Can Wind energy go to remote places? Click on yes or No
Yes or No
Both
Hints
Player
Cop
& Fireman
Asks question
They will have to Move the turbine to Make Electricity and Answer the question too, They will get the Info From clicking on the trees
Points
0
Next
+20
Level
Next Level, they Move to the Next Level and get points
Points
0
Please
try
Again
The player will try again.

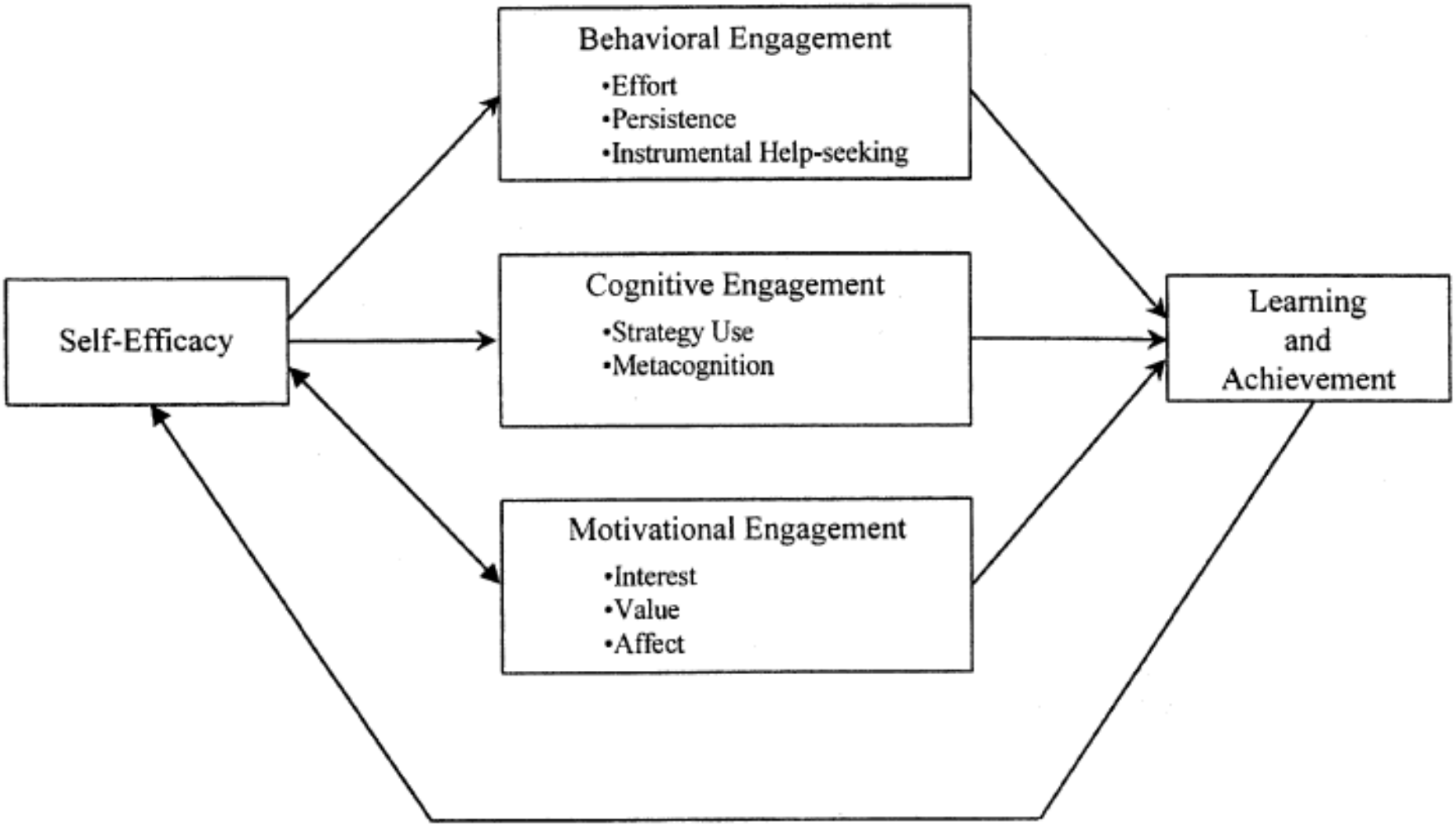

A
assemble
B
blueprint
C
code
D
deploy
COLLECTIBLES
Why hello, and welcome to Alienville. I understand that the solar panels have all been destroyed and you've volunteered to help fix them. How generous!


A
assemble
B
blueprint
C
code
D
deploy
68.44
COLLECTIBLES
Knowledge Quiz
Can Wind energy go to remote places?
A.Yes
B.No
C. neither
D. Both

Limitations in the Current Research Base

- Existing self-regulated learning (SRL) work primarily focuses on well-defined and/or discreet tasks, while **less is known about the role of self-regulation in complex, long-term learning tasks** (Schunk & Zimmerman, 2003; Bernacki, Nokes-Malach, & Aleven, 2015).

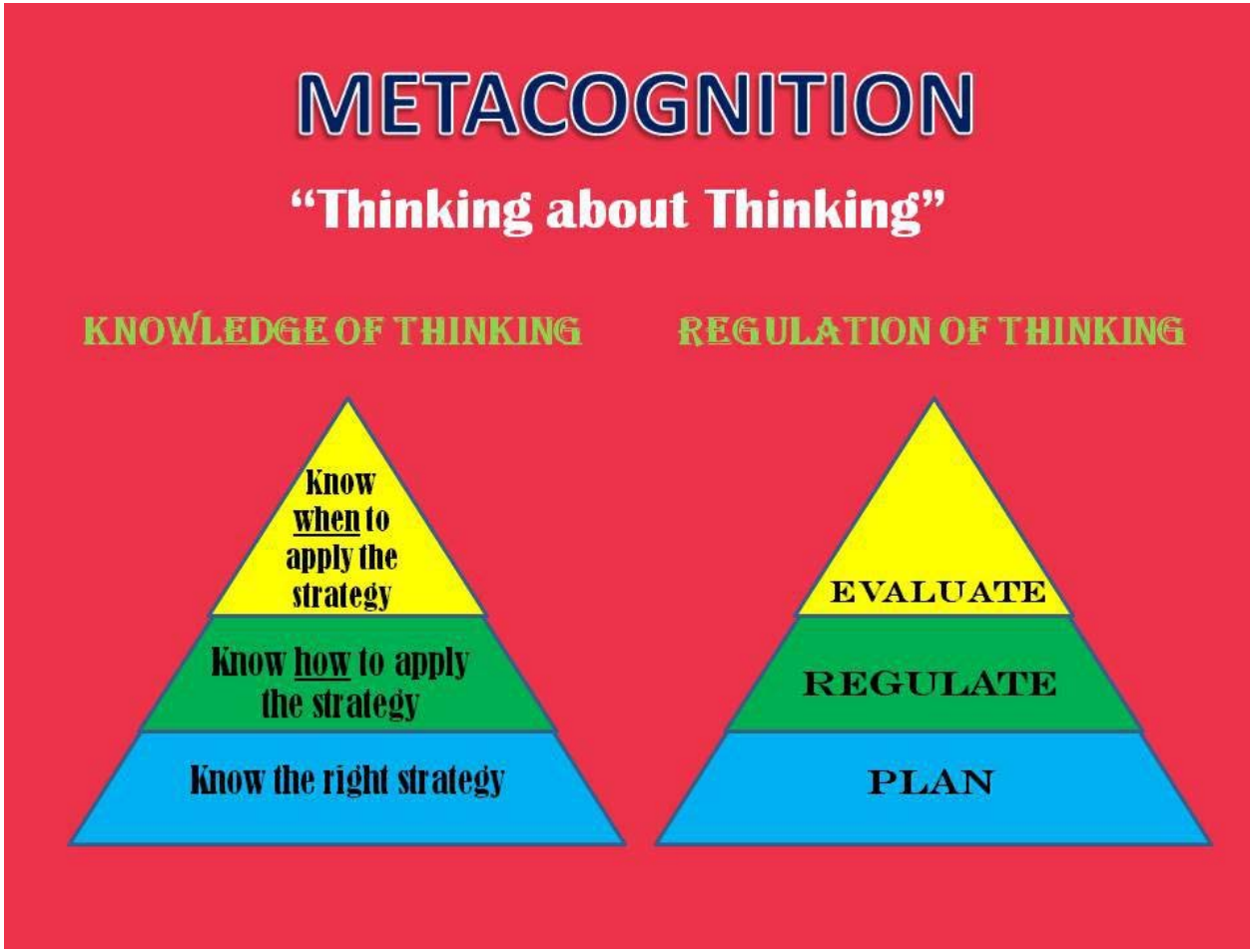
Self-Regulation of Engagement



From: Linnenbrink & Pintrich (2003)

Issue #1:
What is really being measured?

- Are we measuring **self-regulation of science <u>learning</u>** (rather than strategy use or some other cognitive behavior)?



Issue #2: Are methods for measuring self-regulation constructs robust?

- How do we measure self-regulation in a meaningful way?
  - When **students are not reflective** (or are not accurate in their reflections)?
  - Using **data collection procedures** that do not influence the self-regulation process?
  - When goals and related **tasks are complex and variable**?

Contact Information

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Small group focus:

Self-regulation, motivational beliefs, and other factors affecting student learning and persistence in science and STEM