

Region 12 School District Inquiry Training

Frank LaBanca, EdD

NATIONAL CENTER
FOR CENTER
INQUIRY LEARNING

Inquiry Starter

River IQ Game

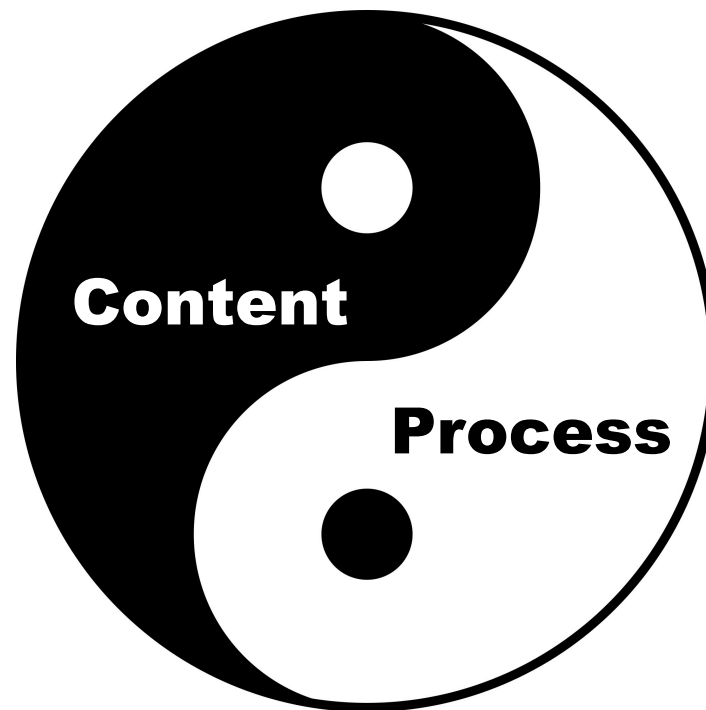
- Only 2 people on the raft at a time.
- The Father cannot stay with any of the daughters, without their Mother's presence.
- The Mother cannot stay with any of the sons, without their Father's presence.
- The thief (striped shirt) cannot stay with any family member, if the Policeman is not there.
- Only the Father, the Mother and the Policeman know how to operate the raft.



Is this a high-quality
inquiry activity?

Inquiry Definition

- Learning by questioning and investigation.
- *To do and learn about* at the same time



Name: _____ Period: _____ Date: _____

Environmental Science Slide Show Project: Aquatic Species

Directions: Using the Internet and other resources, research your assigned topic (aquatic species) and prepare a PowerPoint slide show containing the information outlined below. You might start your search by using your organism's scientific name provided in the attached table. You will be given class time to work on this assignment but may need to finish the work on your own. Save your work in your folder on the school network – not to the hard drive or a disk! On the announced due date, you will present your slide show to the class as part of the project grade. (50 points total)

My assigned topic (aquatic species) is: _____

Organism's common name	Scientific name (for Internet search)
1. Hagfish	<i>Myxine glutinosa</i>
2. Red-bellied piranha	<i>Serrasalmus nattereri</i>
3. Siamese fighting fish	<i>Betta splendens</i>
4. Atlantic snakelocks anemone	<i>Anemonia viridis</i>
5. Sea lamprey	<i>Petromyzon marinus</i>
6. Sandtiger shark	<i>Carcharias taurus</i>
7. Megamouth shark	<i>Megachasma pelagios</i>
8. Smooth hammerhead	<i>Sphyrna zygaena</i>
9. Common skate	<i>Raja batis</i>
10. Manta ray	<i>Manta birostris</i>
11. American horseshoe crab	<i>Limulus polyphemus</i>
12. Australian lungfish	<i>Neoceratodus forsteri</i>
13. European sturgeon	<i>Acipenser sturio</i>
14. Freshwater butterflyfish	<i>Pantodon bucholzi</i>
15. Zebra moray eel	<i>Gymnomuraena zebra</i>
16. Knifefish	<i>Gymnotus carapo</i>
17. Portuguese man-of-war	<i>Physalia physalis</i>
18. West African garter cone	<i>Conus genuanus</i>
19. Blue-ringed octopus	<i>Hapalochlaena lunulata</i>
20. Pearly nautilus	<i>Nautilus pompilius</i>
21. Giant Pacific octopus	<i>Enteroctopus dolfeini</i>
22. Japanese island crab	<i>Macrocheira kaempferi</i>
23. Giant squid	<i>Architeuthis spp.</i>
24. Atlantic ragworm	<i>Nereis virens</i>
25. Sea wasp (Australian box jellyfish)	<i>Chironex fleckeri</i>

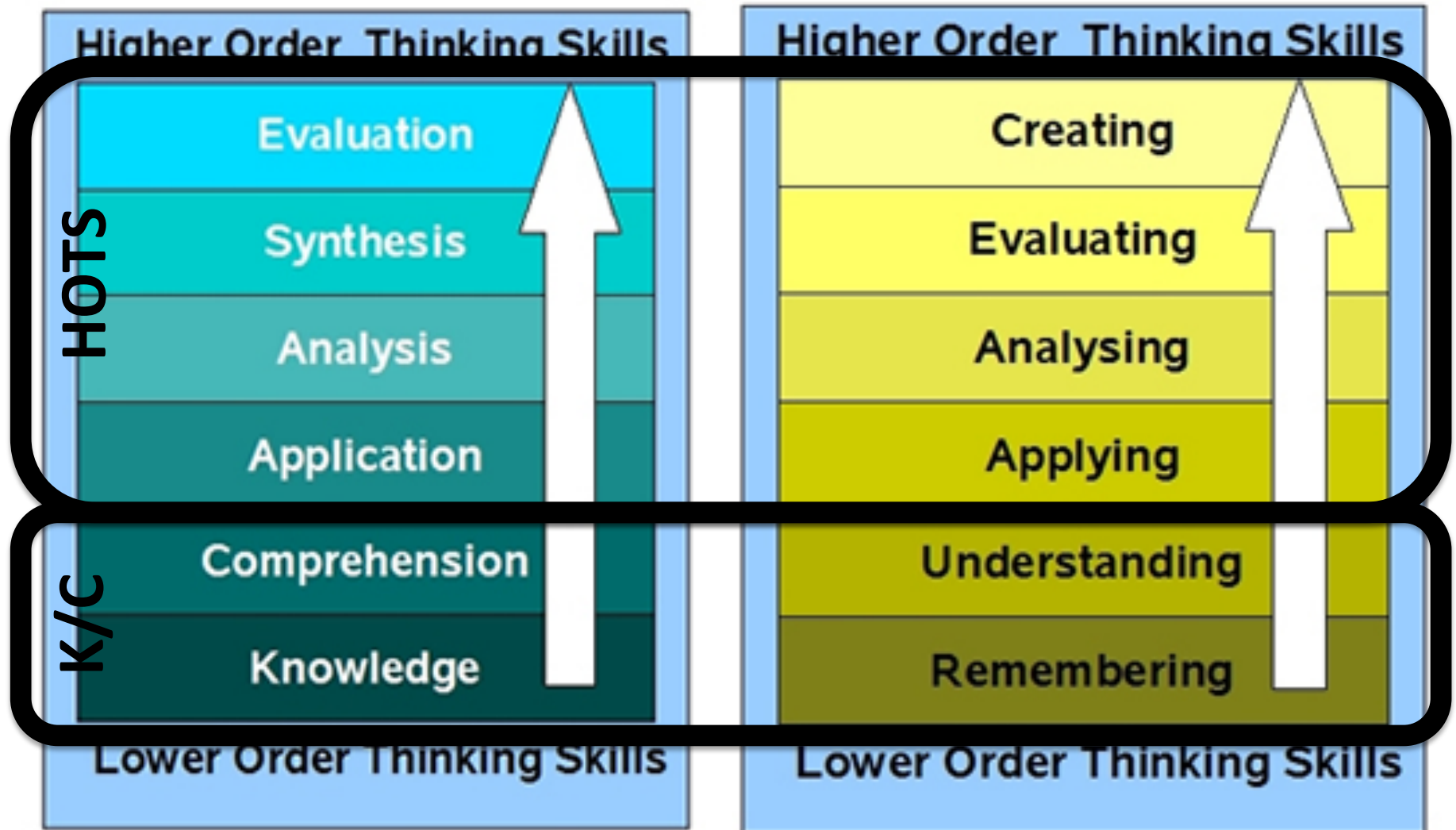
Grading: Your slide show should have all of these:

- a. a title slide with the organism's common name = _____ out of 2 points
- b. the classification of your organism:
- is it a jawless fish, cartilaginous fish,
bony fish, cnidarian, crustacean,
mollusk, or segmented worm? = _____ out of 3 points
- c. at least 3 color photos or pictures of the
organism in its environment = _____ out of 6 points
- d. the organism's physical description:
- its size (adult weight and length)
- its color, markings, or other patterns
- its characteristic body parts or
anatomical structures = _____ out of 10 points
- e. the organism's habitat:
- is it freshwater or marine?
- is it a resident of the coral reef,
kelp bed, benthic zone, or pelagic zone? = _____ out of 5 points
- f. the organism's geographic range or
distribution, including a map of this area = _____ out of 5 points
- g. the organism's diet: what it feeds on and
its niche or role in an aquatic food chain/web = _____ out of 4 points
- h. other interesting or unique facts about
your organism = _____ out of 2 points

Concepts vs. Facts

HOTS vs. K/C

Bloom's Taxonomy

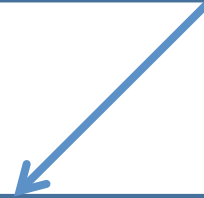


Knowledge /
Comprehension
(K/C)

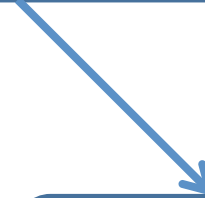


Factual

Higher order thinking
(HOTS)

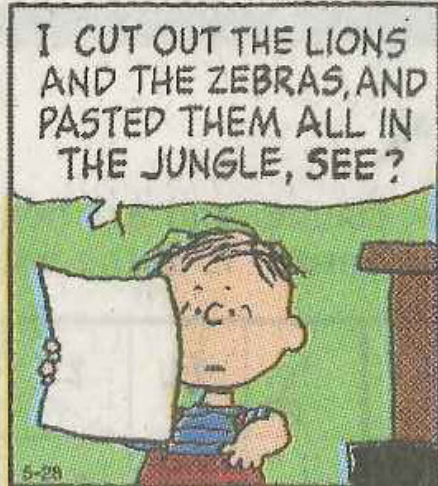


Conceptual



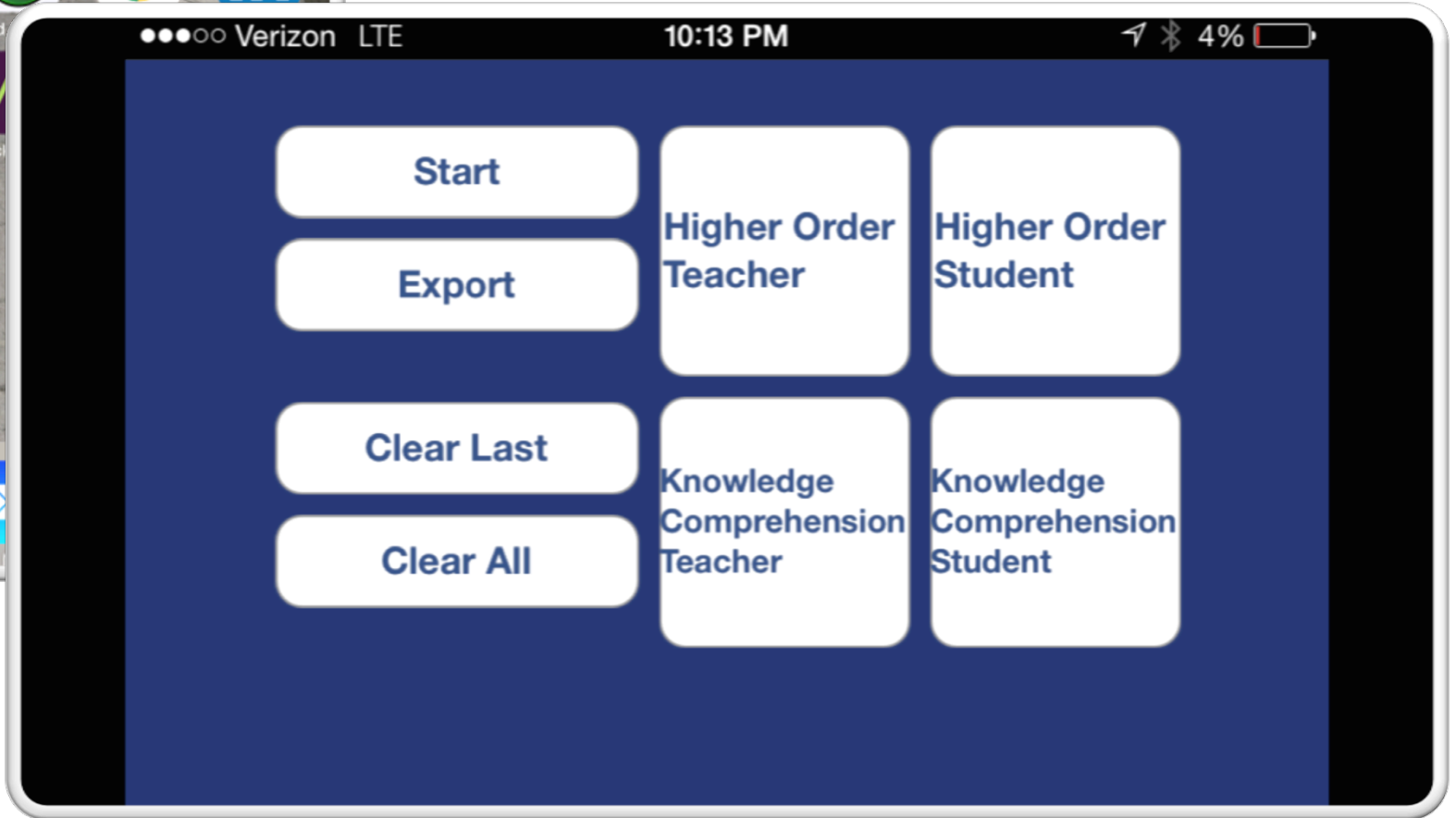
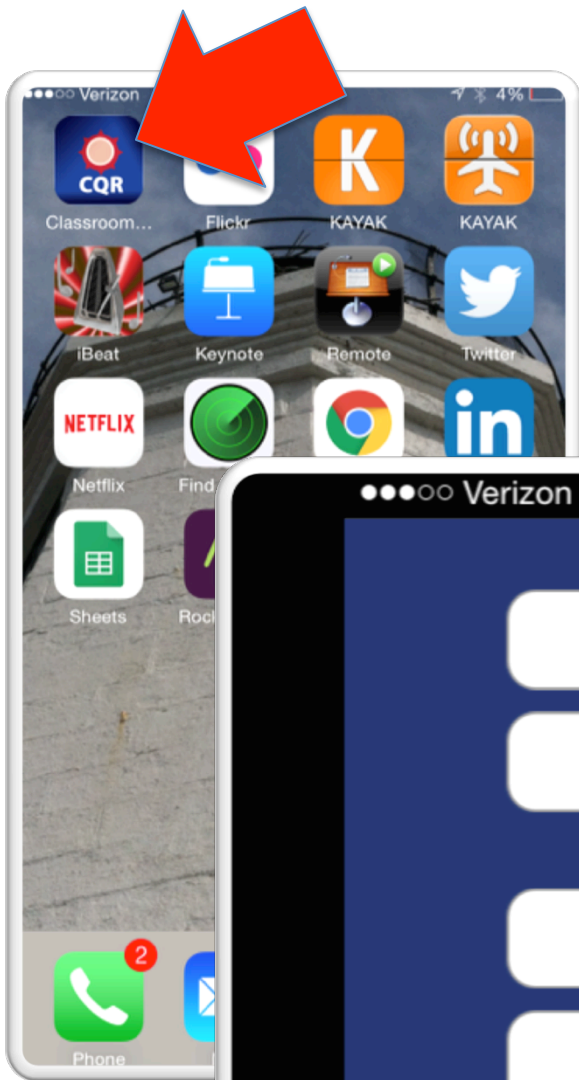
Analytical

PEANUTS Charles M. Schulz



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- http://www.learner.org/vod/vod_window.html?pid=2097

What do you monitor?

Indicator	Definition	Example
Compliance	Students behaving, following directions, not rocking the boat. Obedient. On task behaviors	Students sitting quietly. Completing tasks.
Engagement	Minds-on participation – students questioning. Showing an interest in the conversation. Involved, doing. Hands-on. Cognitive engagement	Discussions, analyzing, creating, raising trout in the classroom. Physically involved. Enthusiasm.
Learning	Cognitive engagement, actively thinking, making connections. Ability to articulate why internalize learning that is relevant/real-life/world	Geo: Understanding angles and spatial relations when parallel parking Explain back a concept in a different way Kids dialogue is focused on conceptual aspects of content

Objectives

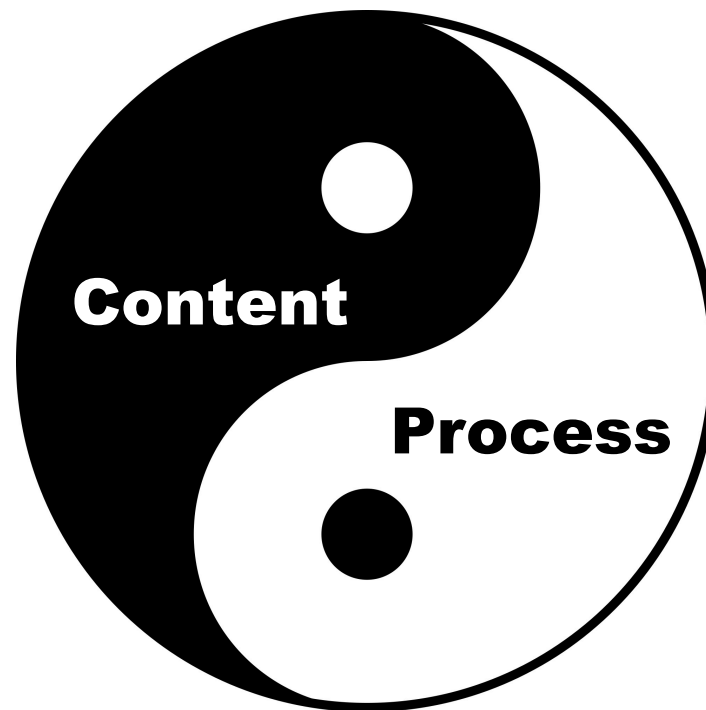
- Conduct and evaluate a design challenge
- Define inquiry, engagement, and rigor
- Examine questioning and types of questions
- Use specific instructional inquiry learning strategies and techniques

Marshmallow Challenge

- Build the tallest FREE STANDING structure using only the CONTENTS of the bag.
- Rules:
 - FREE STANDING
 - MARSHMALLOW MUST BE ON TOP OF THE STRUCTURE
 - 18 MINUTES

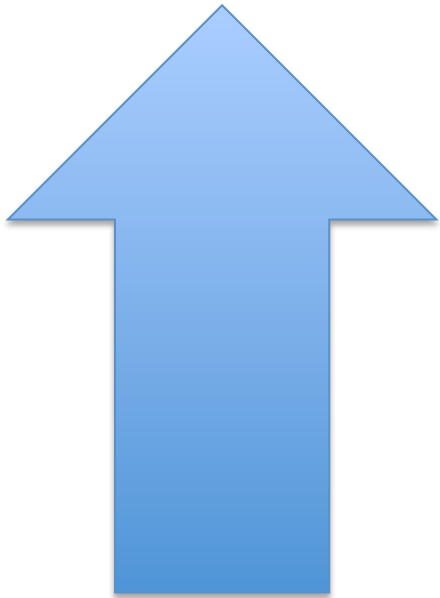
Inquiry Definition

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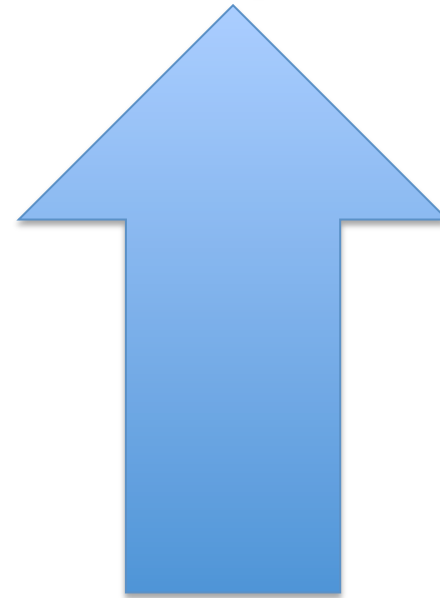


Who is...

Questioning?



Investigating?

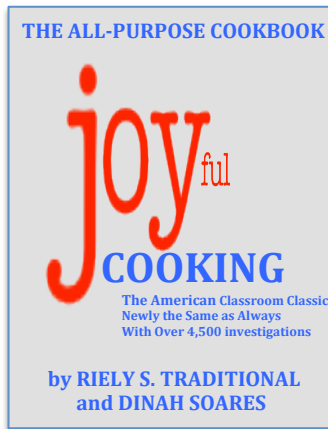


Levels of Inquiry

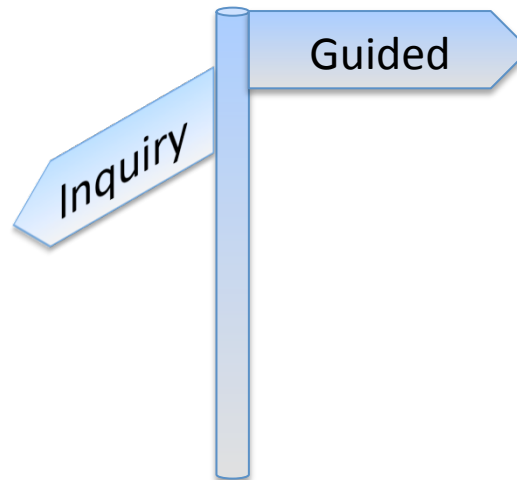
Structured
Inquiry

Guided
Inquiry

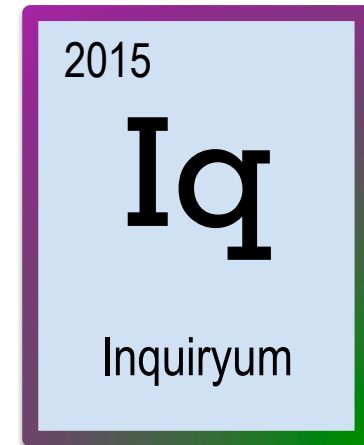
Open
Inquiry



STEP-BY-STEP



PROBLEM-POSED



PROBLEM-BASED

What is Engagement?

Guiding Questions

- How do you define engagement?
- What indicators let you know that there is engagement?
- What do engaged students look like?

Entertainment ≠ Engagement

Entertainment is	Engagement is
Passive	Active
For Enjoyment	For Learning
Short-lived	Has Lasting Results
Doesn't require relevance	Is Relevant and applicable
Allows escape from problems	Solving problems

Is challenging

Describe Engagement

- One idea per PostIt note
- Minimum of 6 per person

Some people say engagement is...

- Whether students are paying attention to the teacher
- Whether the students are actively doing what the teacher has asked them to do
- Whether the students seem to understand what they are expected to do
- Whether students seem to like what they are doing

Engagement and Rigor

- Consider what professional work in your subject area looks like
 - The content of the work
 - The nature of the work
 - The standards by which the work is judged
- Teach standards in the context of authentic investigation, not the other way around
- Cultivate a classroom culture that normalizes intellectual risk taking

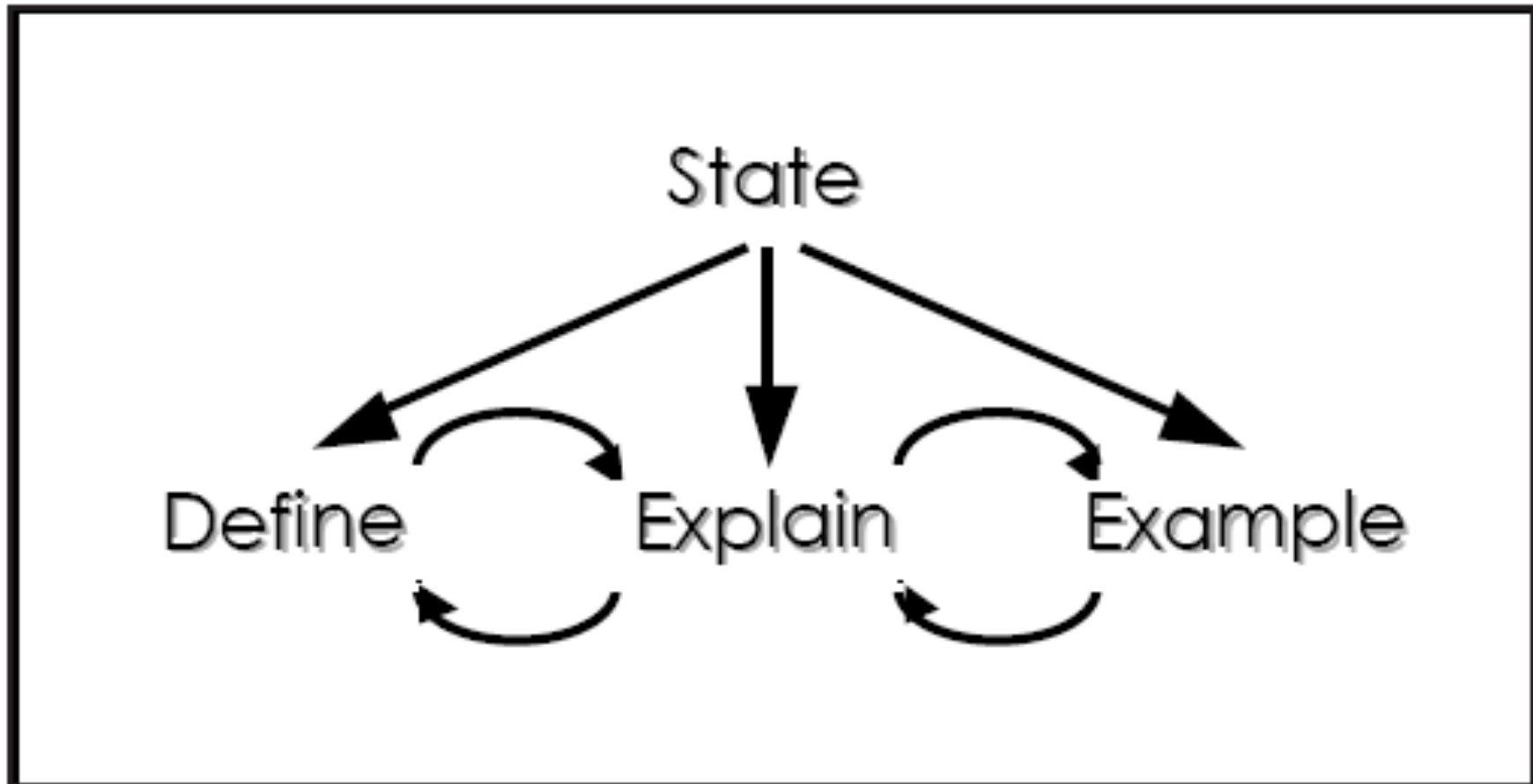


Figure 1. Evidence-based writing model.

Is the work generally correct, complete, and appropriate?

Yes

No

Is there evidence of support, elaboration, and higher-order thinking?

Is there evidence of some understanding?

Yes

No

Yes

No

3

2

1

0

Two examples

- Question: What types of molecules are hydrophobic? Hydrophilic? Give an example of each. What is the basis for the different behaviors of these two (2) types of molecules in water?

Molecules that are composed of plastics or rubbers are hydrophobic, and molecules that are made of fabrics and materials that are absorbant are hydrophilic. The charge of the molecules, and the material that makes up the molecules are what causes these 2 molecules to behave differently in H_2O .

7. Hydrophobic molecules are molecules that repel water and is not attracted to it. Examples of this would be oils, such as the ones on your skin. Hydrophilic molecules are attracted to water. An example of this would be sugar, which dissolves in the water. Hydrophobic molecules are neutral in charge, therefore, they are not attracted to the positively and negatively charged water. Hydrophilic molecules are positively or negatively charged molecules and are attracted to the positively and negatively partial charge of the water.

Question Formulation Technique

— Procedure

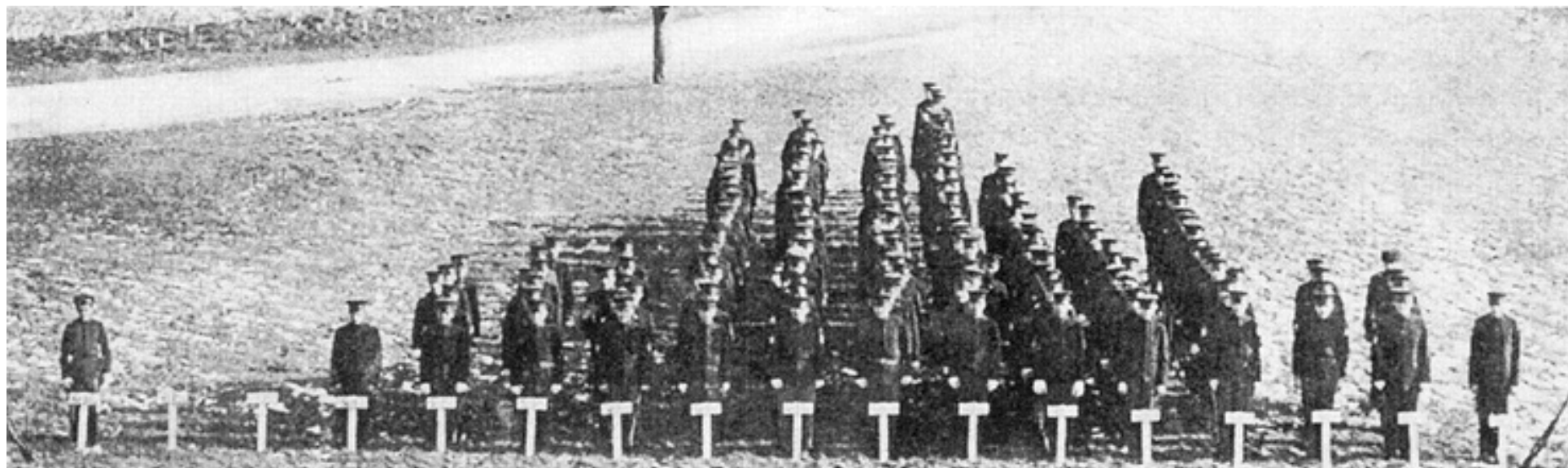
1. Ask as many questions as you can in 5 minutes in response to the video.
2. Do not stop to answer, judge or to discuss the questions.
3. Change any statement into a question.

Rothstein & Santana (2011). *Make just one change: Teach students to ask their own questions.*

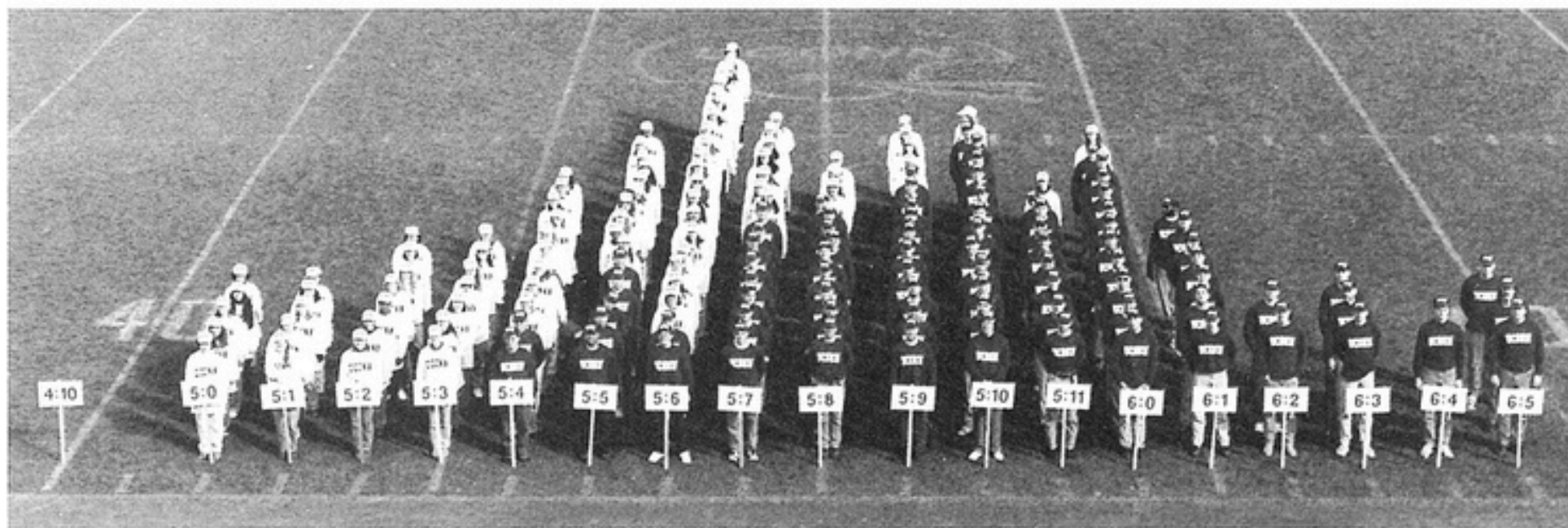




DJS
associates
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4:10 4:11 5:0 5:1 5:2 5:3 5:4 5:5 5:6 5:7 5:8 5:9 5:10 5:11 6:0 6:1 6:2



Open vs. Closed Questions

Closed-ended Questions:

Responses are one-word/phrase response such as yes/no.

Open-ended Questions:

Require more explanations

Advantages and Disadvantages

	<p>Closed-ended Questions</p> <p>Yes/no/one word/short phrase</p>	<p>Open-ended Questions</p> <p>Needs an explanation</p>
<p>Advantage</p>	<p>Expected answer</p> <p>Easy to correct/assess</p> <p>Use for feedback</p> <p>Science teachers like a “right” answer</p> <p>Useful for investigation/clarification</p> <p>Opportunity for collaboration</p> <p>Could require HOTS</p>	<p>Further study</p> <p>Deeper</p> <p>Make connections</p> <p>Opportunity for collaboration</p> <p>Exchange of ideas</p> <p>Divergent thought opportunities</p> <p>Allows for more analysis</p> <p>Could require HOTS</p>
<p>Disadvantage</p>	<p>May lack creativity</p> <p>May not evaluate a breadth of content</p> <p>Tricky to word to evaluate HOTS</p>	<p>May lack direction</p> <p>May not hit the essential content effectively</p> <p>Students may oversimplify/overcomplicate</p> <p>More challenging to evaluate</p>

Open vs. Closed Questions

Go back through your own list of questions and write a “C” next to the question if it is a closed-ended and “O” next to the question if it’s open-ended.

Open-ended ↔ Closed Ended

Rewrite:

- *2 Open-ended questions to make them Closed-ended Questions*
- *2 Closed-ended questions to make them Open-ended Questions*

Prioritize Your Questions

Choose two-three priority questions that :

- Are most important to you
- You need to answer first
- Will help you forward your knowledge of concepts

Share with your group commonalities

Prioritize Group Questions

Choose three questions that :

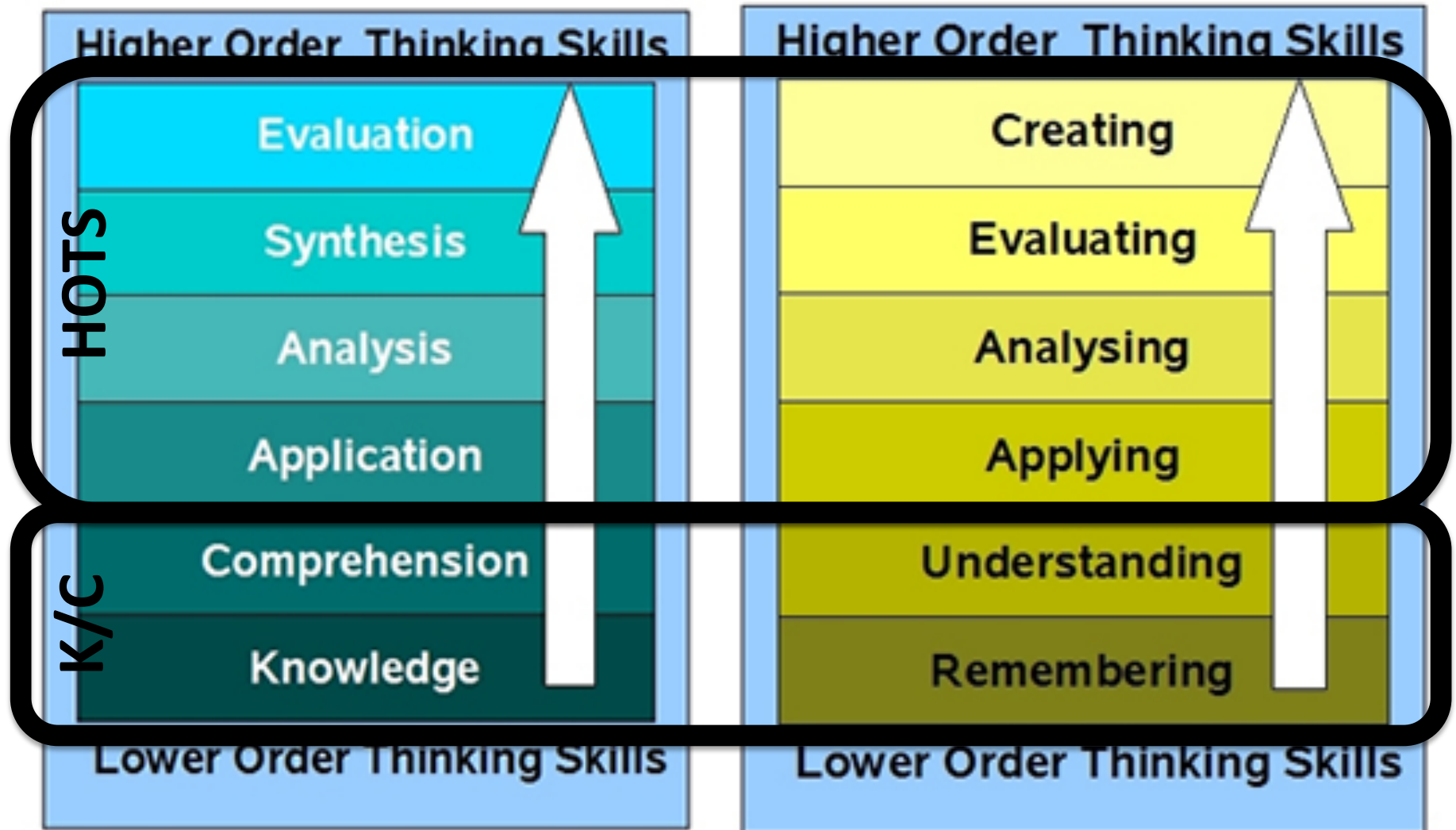
- Are most important
- You need to answer first
- Will help you forward your knowledge of concepts

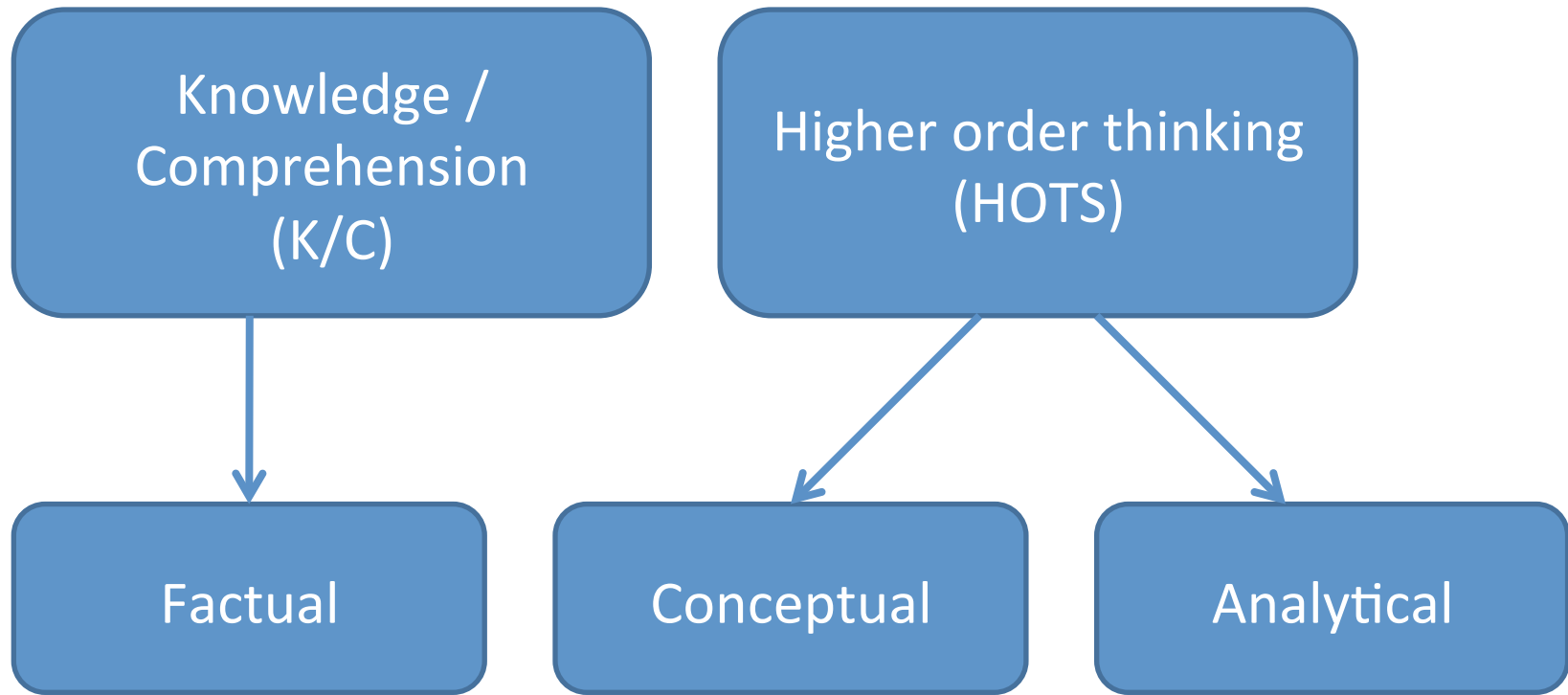
When you have chosen your questions as a group, write them in the center of the paper.

Objective Assessment Analysis

- Concepts vs. Facts
- HOTS vs. K/C

Bloom's Taxonomy





Forum Questioning

Answer the following question. Elaborate in no more than 2 sentences. Write your answer on a notecard:

What is your favorite method of assessment?

Forum Questioning

Based on your professional experience, what is a key feature to high-quality assessment? Justify your response with no more than two sentences of evidence. You may not repeat any previous answer, but you may elaborate. Be sure to respectfully agree or disagree with your colleagues to support your position.

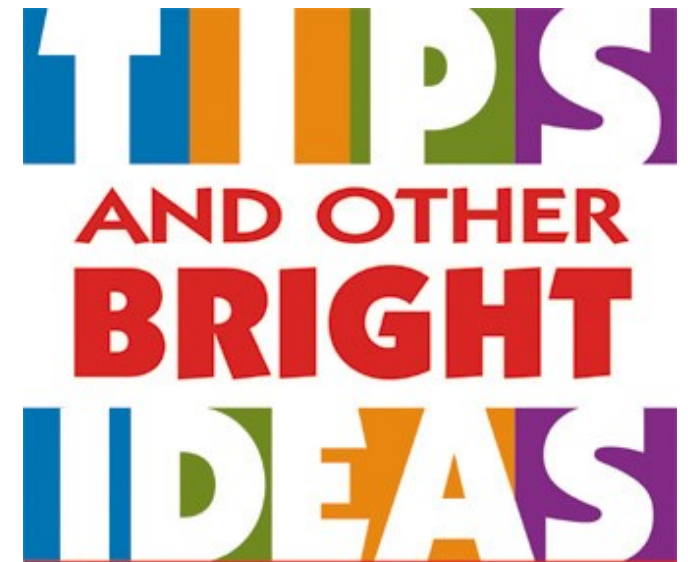
Forum Assumptions

- Open-ended conceptual questioning improves student learning
- Using technology as an instructional tool can work as well as traditional instructional techniques
- Students learn well in a social-cognitive setting



Instructional tips

- Ask conceptual questions.
- Demand quality technical writing.
- Put a limit on it!
- Remember Internet safety.
- Assess with a rubric.



Follow up work

- Create a forum for students with a conceptual open ended question. Bring sample of student work and method of assessment.