

Strategies to Increase Rigor and Relevance in the CTE Classroom

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Rigor/Relevance Framework[®]

A Guide to Focusing Resources to Increase Student Performance



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Rigor/Relevance Framework

The Rigor/Relevance Framework® is a tool developed by staff of the International Center for Leadership in Education to examine curriculum, instruction, and assessment. The Rigor/Relevance Framework is based on two dimensions of higher standards and student achievement.

First, a continuum of knowledge describes the increasingly complex ways in which we think. This Knowledge Taxonomy is based on the six levels of Bloom’s Taxonomy:

6. Evaluation
5. Synthesis
4. Analysis
3. Application
2. Comprehension
1. Knowledge/Awareness



The low end of this continuum involves acquiring knowledge and being able to recall or locate that knowledge in a simple manner. Just as a computer completes a word search in a word processing program, a competent person at this level can scan thousands of bits of information in the brain to locate that desired knowledge.

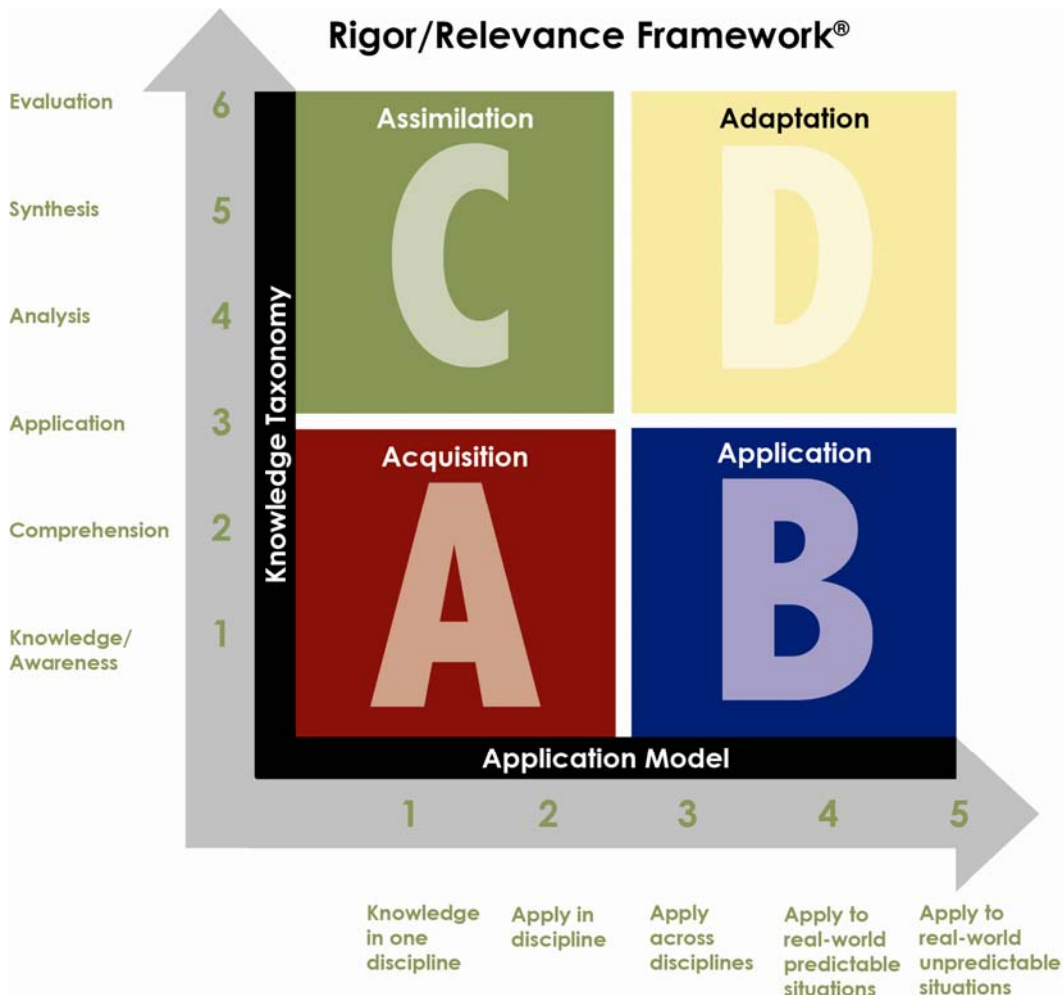
The high end of the Knowledge Taxonomy labels more complex ways in which individuals use knowledge. At this level, knowledge is fully integrated into one’s mind, and individuals can do much more than locate information—they can take several pieces of knowledge and combine them in both logical and creative ways. Assimilation of knowledge is an accurate way to describe this high level of the thinking continuum. Assimilation is often a higher order thinking skill: at this level, the student can solve multi-step problems, create unique work, and devise solutions.

The second continuum, created by Dr. Bill Daggett, is known as the Application Model. The five levels of this action continuum are:

- | | | | | |
|--------------------------------|------------------------|-----------------------------|---|---|
| 1. Knowledge in one discipline | 2. Apply in discipline | 3. Apply across disciplines | 4. Apply to real-world predictable situations | 5. Apply to real-world unpredictable situations |
|--------------------------------|------------------------|-----------------------------|---|---|



The Application Model describes putting knowledge to use. While the low end is knowledge acquired for its own sake, the high end signifies action—use of that knowledge to solve complex real-world problems and create projects, designs, and other works for use in real-world situations.



The Rigor/Relevance Framework has four quadrants.

Quadrant A represents simple recall and basic understanding of knowledge for its own sake. Quadrant C represents more complex thinking but still knowledge for its own sake. Examples of Quadrant A knowledge are knowing that the world is round and that Shakespeare wrote *Hamlet*.

Quadrant C embraces higher levels of knowledge, such as knowing how the U.S. political system works and analyzing the benefits and challenges of the cultural diversity of this nation versus other nations.

Quadrants B and D represent action or high degrees of application. Quadrant B would include knowing how to use math skills to make purchases and count change. The ability to access information in wide-area network systems and the ability to gather knowledge from a variety of sources to solve a complex problem in the workplace are types of Quadrant D knowledge.

Each of these four quadrants can also be labeled with a term that characterizes the learning or student performance.

Quadrant A — Acquisition

Students gather and store bits of knowledge and information. Students are primarily expected to remember or understand this acquired knowledge.

Quadrant B — Application

Students use acquired knowledge to solve problems, design solutions, and complete work. The highest level of application is to apply appropriate knowledge to new and unpredictable situations.

Quadrant C — Assimilation

Students extend and refine their acquired knowledge to automatically and routinely analyze and solve problems as well as create unique solutions.

Quadrant D — Adaptation

Students have the competence to think in complex ways and apply knowledge and skills they have acquired. Even when confronted with perplexing unknowns, students are able to use extensive knowledge and skill to create solutions and take action that further develops their skills and knowledge.

Technical Reading and Writing Example

Quadrant A—Recall definitions of various technical terms.

Quadrant B—Follow written directions to install new software on a computer.

Quadrant C—Compare and contrast several technical documents to evaluate purpose, audience, clarity.

Quadrant D—Write procedures for installing and trouble-shooting new software.

The Rigor/Relevance Framework is a fresh approach to looking at college- and career-ready standards and assessment. It is based on traditional elements of education, yet encourages movement from acquisition of knowledge to application of knowledge.

The framework is easy to understand. With its simple, straightforward structure, it can serve as a bridge between the school and the community. It offers a common language with which to express the notion of a more rigorous and relevant curriculum and encompasses much of what parents, business leaders, and community members want students to learn. The framework is versatile; it can be used in the development of instruction and assessment. Likewise, teachers can measure their progress in adding rigor and relevance to instruction and select appropriate instructional strategies to meet learner needs and higher achievement goals.

Defining Rigor

A versatile way to define the level of rigor of curriculum objectives, instructional activities, or assessments is the Knowledge Taxonomy Verb List (see page 6). The Verb List can be used either to create a desired level of expected student performance or to evaluate the level of existing curriculum, instruction or assessment.

An example of student performance at various levels follows. Notice each statement starts with a verb that comes from the appropriate section of the Verb List. The expected achievement level for teaching about nutrition can vary depending on the purpose of the instruction. If a teacher only wants students to acquire basic nutritional knowledge, a student performance set at level one or two is adequate. If the instruction is intended to have a more significant impact on nutritional habits, then some of the objectives need to be similar to levels four through six.

Basic Nutrition

Level	Performance
1 Knowledge/Awareness	Label foods by nutritional groups.
2 Comprehension	Explain nutritional value of individual foods.
3 Application	Make use of nutritional guidelines when planning meals.
4 Analysis	Examine success in achieving nutritional goals.
5 Synthesis	Develop personal nutritional goals.
6 Evaluation	Appraise results of personal eating habits over time.

Note that each of the levels requires students to think differently. Levels four through six require more complex thinking than levels one through three.

When creating lesson plans and student objectives, selecting the proper word from the Knowledge Taxonomy Verb List can help describe the appropriate performance. Simply start with a verb from the desired level and finish the statement with a specific description of that skill or knowledge area.

The Verb List can also be used to evaluate existing lesson plans, assessments, and instructional experiences. Looking for verbs and identifying their level will give a good indication of the level of student performance in that instruction.

Defining Relevance

Defining the level of relevance of curriculum objectives and instructional activities is a little more difficult than determining the Knowledge Taxonomy level because there is no verb list. However, just as the Knowledge Taxonomy categorizes increasing levels of thinking, the Application Model describes increasingly complex applications of knowledge. Any student performance can be expressed as one of five levels of the Application Model. The Application Model Decision Tree (see page 7) can assist in setting the desired level of expected student performance in application by asking the questions: **Is it application? Is it real world? Is it unpredictable?**

The Basic Nutrition example that follows is similar to the one above in that it uses nutrition to describe student performance at various levels. Each level requires students to apply knowledge differently.

Basic Nutrition

Level	Performance
1 Knowledge in One Discipline	Label foods by nutritional groups.
2 Application in One Discipline	Rank foods by nutritional value.
3 Interdisciplinary Application	Make cost comparisons of different foods considering nutritional value.
4 Real-World Predictable Situations	Develop a nutritional plan for a person with a health problem affected by food intake.
5 Real-World Unpredictable Situations	Devise a sound nutritional plan for a group of 3-year-olds who are picky eaters.

Similarly, the expected achievement level for teaching about nutrition can vary depending on the purpose of the instruction. If a teacher wants students only to acquire basic nutritional knowledge, a student

performance set at level one is adequate. If the instruction is intended to have a significant impact on nutritional habits, then some of the objectives need to be at levels four and five.

Use of the Decision Tree can help describe desired performance. Start by writing draft statements of student objectives and then use the Decision Tree to reflect on and revise these statements. The Decision Tree focuses on the three key characteristics that distinguish levels of the Application Model: application, real world, and unpredictability. The Decision Tree offers additional criteria to determine whether an objective meets the test of application, real world, and unpredictability.

The Decision Tree can also be used to evaluate existing lesson plans, assessments, and instructional experiences. Answer the questions to identify at which level of student performance that instruction or assessment is.

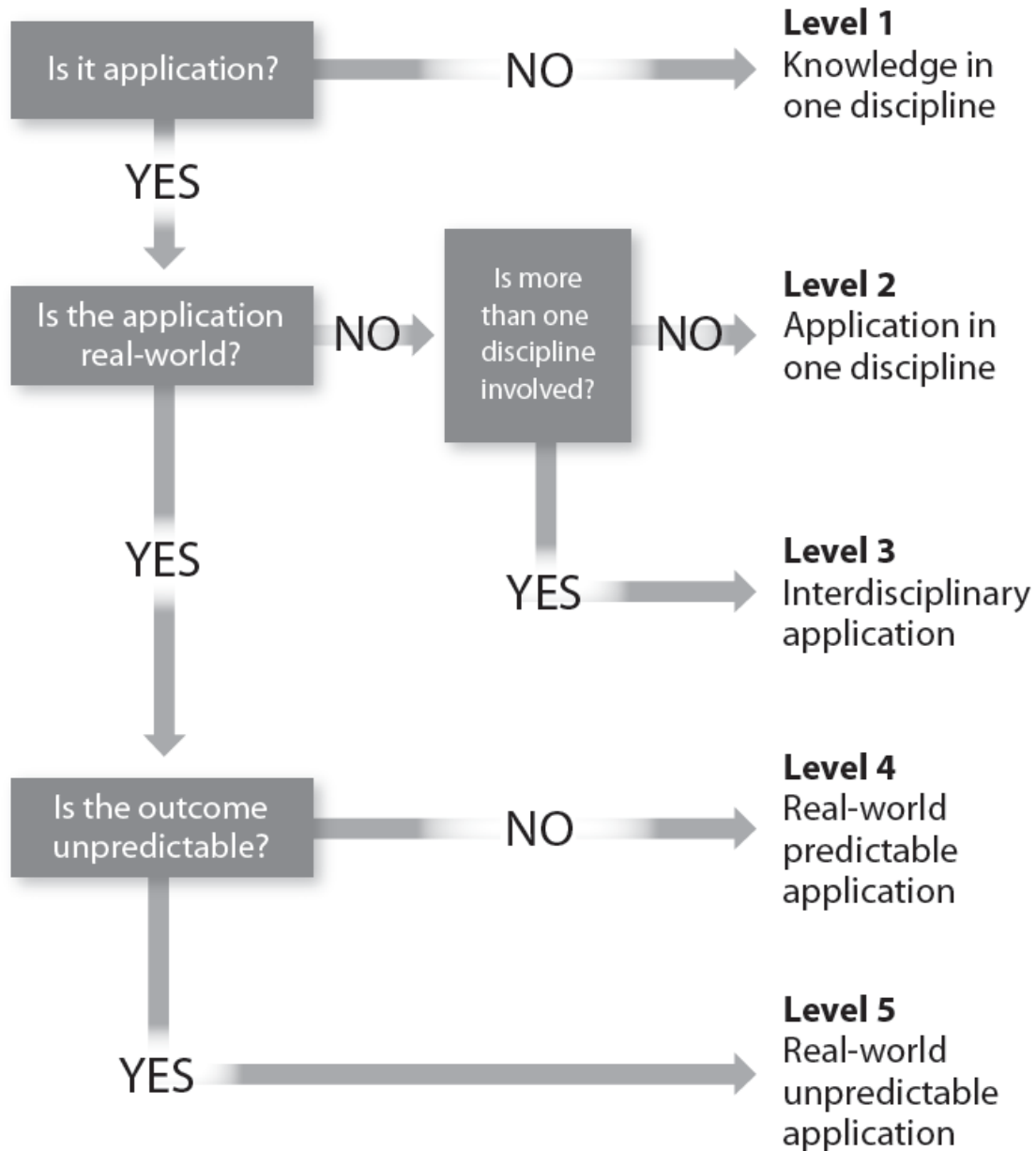
Verb List by Quadrant

Use the Verb List by Quadrant to define the level of rigor. You can use this list to either create a desired level of expected student performance or to evaluate the level of existing curriculum, instruction, or assessment.

Quadrant A	Quadrant B	Quadrant C	Quadrant D
Calculate	Adjust	Analyze	Adapt
Choose	Apply	Categorize	Argue
Count	Build	Cite	Compose
Define	Collect	Classify	Conclude
Describe	Construct	Compare	Create
Find	Demonstrate	Conclude	Design
Identify	Display	Contrast	Develop
Label	Dramatize	Debate	Discover
List	Draw	Defend	Explore
Locate	Fix	Diagram	Formulate
Match	Follow	Differentiate	Invent
Memorize	Illustrate	Discriminate	Modify
Name	Interpret	Evaluate	Plan
Point to	Interview	Examine	Predict
Recall	Look up	Explain	Prioritize
Recite	Maintain	Express	Propose
Record	Make	Generate	Rate
Say	Measure	Infer	Recommend
Select	Model	Judge	Revise
Spell	Operate	Justify	Teach
View	Play	Prove	
	Practice	Research	
	Produce	Study	
	Relate	Summarize	
	Role-play		
	Sequence		
	Show		
	Solve		

Application Model Decision Tree

Select a task, application, or activity. To determine the level of relevance, use the Application Model Decision Tree to reflect on it by answering the following questions.



Teacher Questions by Quadrant

Ask questions to summarize, analyze, organize, or evaluate:

- How are these similar/different?
- How is this like _____?
- What's another way we could say/explain/express that?
- What do you think are some reasons/causes that _____?
- Why did _____ changes occur?
- How can you distinguish between _____?
- What is a better solution to _____?
- How would you defend your position about _____?
- What changes to _____ would you recommend?
- What evidence can you offer?
- How do you know?
- Which ones do you think belong together?
- What things/events lead up to _____?
- What is the author's purpose?

Ask questions to predict, design, or create:

- How would you design a _____ to _____?
- How would you compose a song about _____?
- How would you rewrite the ending to the story?
- What would be different today, if that event occurred as _____?
- Can you see a possible solution to _____?
- How could you teach that to others?
- If you had access to all the resources, how would you deal with _____?
- How would you devise your own way to deal with _____?
- What new and unusual uses would you create for _____?
- Can you develop a proposal that would _____?
- How would you have handled _____?
- How would you do it differently?

C D
A B

Note: Quadrants B and D involve students "doing" as well as answering questions, but these questions help to move students toward increased relevance.

Ask questions to recall facts, make observations, or demonstrate understanding:

- What is/are _____?
- How many _____?
- How do/does _____?
- What did you observe _____?
- What else can you tell me about _____?
- What does it mean _____?
- What can you recall _____?
- Where did you find that _____?
- Who is/was _____?
- In what ways _____?
- How would you define that in your own terms?
- What do/did you notice about this _____?
- What do/did you feel/see/hear/smell _____?
- What do/did you remember about _____?
- What did you find out about _____?

Ask questions to apply or relate:

- How would you do that?
- Where will you use that knowledge?
- How does that relate to your experience?
- How can you demonstrate that?
- What observations relate to _____?
- Where would you locate that information?
- Calculate that for _____?
- How would you illustrate that?
- How would you interpret that?
- Who could you interview?
- How would you collect that data?
- How do you know it works?
- Can you show me?
- Can you apply what you know to this real-world problem?
- How do you make sure it is done correctly?



HESS COGNITIVE RIGOR MATRIX | Career & Technical Education (CTE CRM) :



Hess' Interpretation Applying Webb's Depth-of-Knowledge Levels to Bloom's Cognitive Process Dimensions

Revised Bloom's Taxonomy	Webb's DOK Level 1 Recall & Reproduction	Webb's DOK Level 2 Skills & Concepts	Webb's DOK Level 3 Strategic Thinking/Reasoning	Webb's DOK Level 4 Extended Thinking
	Use these Hess CRM curricular examples with most assignments, assessments, or inquiry activities for Career & Technical Education			
Remember Memorize, recognize, recall, locate, identify	<ul style="list-style-type: none"> o Recall or locate key facts, terms, details, procedures (e.g., explicit in a technical manual) o Select correct terms/ graphics for intended meaning o Describe/explain who, what, where, when, or how o Define terms, principles, concepts o Represent relationships with words, diagrams, symbols o Solve routine problems 	<ul style="list-style-type: none"> o Specify and explain relationships (e.g., non-examples/examples; cause-effect; if-then) o Summarize procedures, results, concepts, key ideas (paragraph) o Make and explain estimates, basic inferences, or predictions o Use models to explain concepts o Make and record observations 	<ul style="list-style-type: none"> o Explain, generalize, or connect ideas using supporting evidence (quote, example, text reference, data); o Justify your interpretation when more than one is plausible o Explain how a concept can be used to solve a non-routine problem o Develop a multi-paragraph manual or infographic for specific purpose/focus 	<ul style="list-style-type: none"> o Use multiple sources to outline varying perspectives on a problem or issue o Explain how a concept relates across content domains or to 'big ideas' (e.g., patterns in the human or designed world; structure-function) o Apply generalizations from one investigation to new problem-based situations, using evidence or data
Apply Carry out or use a procedure in a given situation; carry out (apply to a familiar task), or use (transfer) to an unfamiliar or non-routine task	<ul style="list-style-type: none"> o Apply basic formulas, algorithms, conversion rules o Calculate; measure o Use reference materials and tools to gather information o Demo safe procedures 	<ul style="list-style-type: none"> o Select and use appropriate tool or procedure for specified task o Use context to identify the meaning of terms/phrases o Interpret information using diagrams, data tables, etc. 	<ul style="list-style-type: none"> o Build or revise a plan for investigation using (new) evidence/data o Use and show reasoning, planning, and evidence to support conclusions or to identify design flaws o Conduct a designed investigation 	<ul style="list-style-type: none"> o Draw from source materials with intent to develop a complex or multimedia product with personal viewpoint o Conduct a project that specifies a problem, identifies solution paths, tests the solution, and reports results
Analyze Break into constituent parts, determine how parts relate, compare-contrast, differentiate between relevant-irrelevant, distinguish, focus, select, organize, outline, find coherence, deconstruct (e.g., for potential bias, point of view, technique/strategy used)	<ul style="list-style-type: none"> o Identify trend, pattern, possible cause, or effect o Describe processes or tools used to research ideas o Identify ways symbols or metaphors are used to represent universal ideas o Retrieve data to answer a question (e.g., diagram, graph) 	<ul style="list-style-type: none"> o Compare similarities/ differences or draw inferences about _____ due to influences of _____ o Distinguish relevant-irrelevant information; fact/opinion; primary from a secondary source o Extend a pattern o Organize and represent data o Categorize materials, data, etc. based on characteristics 	<ul style="list-style-type: none"> o Interpret information from a complex graph/model (e.g., interrelationships among variables, concepts) o Use reasoning, planning, and evidence to support or refute inferences or results stated o Use reasoning and evidence to generate criteria for making and supporting an argument o Generalize & support a pattern/trend 	<ul style="list-style-type: none"> o Analyze multiple sources of evidence (e.g., compare/contrast various plans, solution methods) o Analyze and compare diverse/complex/abstract perspectives, models, etc. o Gather, organize, and analyze information from multiple sources to answer a research question
Evaluate Make judgments based on specified criteria, detect inconsistencies, flaws, or fallacies, judge, critique	<p>"UG" – unsubstantiated generalizations = stating an opinion without providing any support for it!</p> <ul style="list-style-type: none"> o Brainstorm ideas, concepts, problems, or perspectives related to a given scenario, observation, question posed 		<ul style="list-style-type: none"> o Develop a logical argument for conjectures, citing evidence o Verify reasonableness of results or conjectures (e.g., of others) o Critique conclusions drawn/evidence used/credibility of sources 	<ul style="list-style-type: none"> o Evaluate relevancy, accuracy, & completeness of sources used o Apply understanding in a novel way, provide argument/ justification for the application o Critique the historical impact of _____ on _____
Create Reorganize into new patterns/schemas, design, plan, produce		<ul style="list-style-type: none"> o Generate testable conjectures/hypotheses based on observations, prior knowledge, and/or artifacts 	<ul style="list-style-type: none"> o Develop a complex model for given concept and justify reasoning o Develop an alternative solution and justify reasoning 	<ul style="list-style-type: none"> o Synthesize information across multiple models, sources, or texts o Articulate new knowledge or new perspective

Revised Bloom's Taxonomy – Question Starters

Remembering- Knowledge

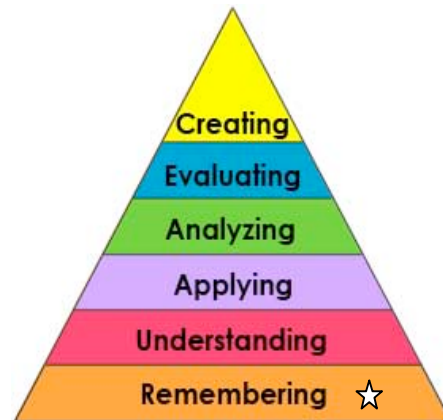
Recall or recognize information, and ideas

The teacher should:

- Present information about the subject to the student
- Ask questions that require the student to recall the information presented
- Provide verbal or written texts about the subject that can be answered by recalling the information the student has learned

Question prompts

What do you remember about _____ ?
How would you define _____ ?
How would you identify _____ ?
How would you recognize _____ ?
What would you choose _____ ?
Describe what happens when _____ ?
How is (are) _____ ?
Where is (are) _____ ?
Which one _____ ?
Who was _____ ?
Why did _____ ?
What is (are) _____ ?
When did _____ ?
How would you outline _____ ?
List the _____ in order.



Anderson & Krathwohl, 2001

Understanding-Comprehension

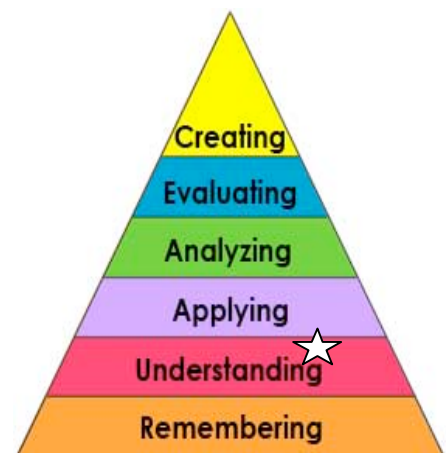
Understand the main idea of material heard, viewed, or read. Interpret or summarize the ideas in own words.

The teacher should:

- Ask questions that the student can answer in his/her own words by stating facts or by identifying the main idea.
- Give tests based on classroom instruction

Question prompts:

How would you compare _____ ? Contrast _____ ?
How would you clarify the meaning _____ ?
How would you differentiate between _____ ?
How would you generalize _____ ?
How would you express _____ ?
What can you infer from _____ ?
What did you observe _____ ?
How would you identify _____ ?
How can you describe _____ ?
Will you restate _____ ?
Elaborate on _____ .
What would happen if _____ ?
What is the main idea of _____ ?
What can you say about _____ ?



Anderson & Krathwohl, 2001

Applying-Application

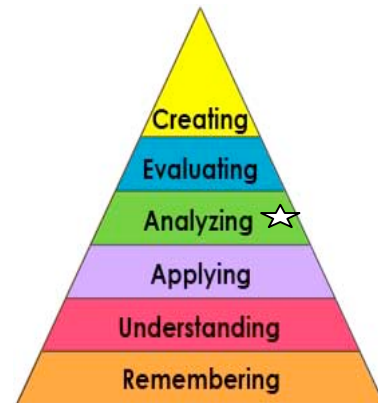
Apply an abstract idea in a concrete situation to solve a problem or relate it to prior experience.

The teacher should:

- Provide opportunities for the student to use ideas, theories, or problem solving techniques and apply them to new situations.
- Review the student's work to ensure that he/she is using problem solving techniques independently.
- Provide questions that require the student to define and solve problems.

Questioning prompts:

What actions would you take to perform _____?
How would you develop _____ to present _____?
What other way would you choose to _____?
What would the result be if _____?
How would you demonstrate _____?
How would you present _____?
How would you change _____?
How would you modify _____?
How could you develop _____?
Why does _____ work?
How would you alter _____ to _____?
What examples can you find that _____?
How would you solve _____?



Anderson & Krathwohl, 2001

Analyzing - Analysis

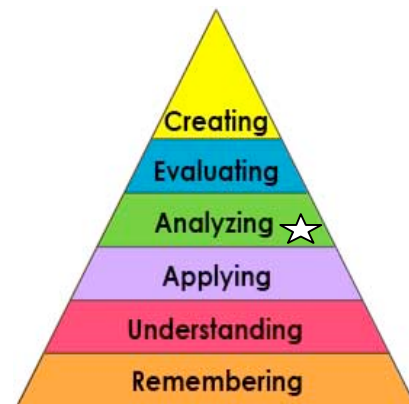
Break down a concept or idea into parts and show relationships among the parts.

The teacher should:

- Allow time for students to examine concepts and ideas and to break them down into basic parts.
- Require students to explain why they chose a certain problem solving technique and why the solution worked.

Questioning prompts:

How can you classify _____ according to _____?
How can you compare the different parts _____?
What explanation do you have for _____?
How is _____ connected to _____?
Discuss the pros and cons of _____.
How can you sort the parts _____?
What is the analysis of _____?
What can you infer _____?
What ideas validate _____?
How would you explain _____?
What can you point out about _____?
What is the problem with _____?
Why do you think _____?



Anderson & Krathwohl, 2001

Evaluating- Evaluation

Make informed judgments about the value of ideas or materials. Use standards and criteria to support opinions and views.

The teacher should:

- Provide opportunities for students to make judgments based on appropriate criteria.
- Have students demonstrate that they can judge, critique, or interpret processes, materials, methods, etc. using standards and criteria.

Questioning prompts:

What criteria would you use to assess _____?

What data was used to evaluate _____?

What choice would you have made _____?

How would you determine the facts _____?

What is the most important _____?

What would you suggest _____?

How would you grade _____?

What is your opinion of _____?

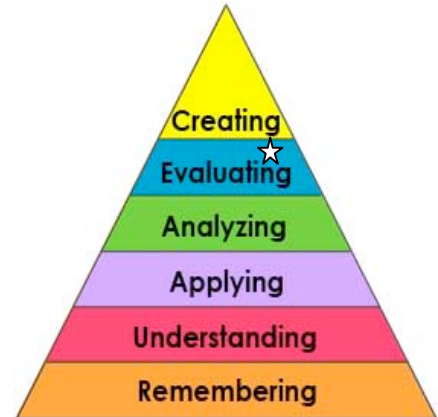
How could you verify _____?

What information would you use to prioritize _____?

Rate the _____.

Rank the importance of _____.

Determine the value of _____.



Creating-Synthesis

Bring together parts of knowledge to form a whole and build relationships for new situations.

The teacher should:

- Provide opportunities for students to assemble parts of knowledge into a whole using creative thinking and problem solving.
- Require students to demonstrate that they can combine concepts to build new ideas for new situations.

Questioning prompts:

What alternative would you suggest for _____?

What changes would you make to revise _____?

How would you explain the reason _____?

How would you generate a plan to _____?

What could you invent _____?

What facts can you gather _____?

Predict the outcome if _____.

What would happen if _____?

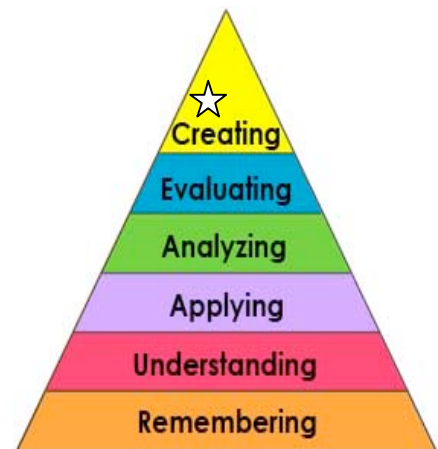
How would you portray _____?

Devise a way to _____.

How would you compile the facts for _____?

How would you elaborate on the reason _____?

How would you improve _____?



STUDENT	ES
Prior knowledge and background	
Field independence	0.68
Non-standard dialect use	-0.29
Piagetian programs	1.28
Prior ability	0.94
Prior achievement	0.55
Relating creativity to achievement	0.40
Relations of high school to university achievement	0.60
Relations of high school achievement to career performance	0.38
Self-reported grades	1.33
Working memory strength	0.57
Beliefs, attitudes and dispositions	
Attitude to content domains	0.35
Concentration/persistence/ engagement	0.56
Grift/incremental vs. entity thinking	0.25
Mindfulness	0.29
Morning vs. evening	0.12
Perceived task value	0.46
Positive ethnic self-identity	0.12
Positive self-concept	0.41
Self-efficacy	0.92
Stereotype threat	0.33
Student personality attributes	0.26
Motivational approach, orientation	
Achieving motivation and approach	0.44
Boredom	-0.49
Deep motivation and approach	0.69
Depression	-0.36
Lack of stress	0.17
Mastery goals	0.06
Motivation	0.42
Performance goals	-0.01
Reducing anxiety	0.42
Surface motivation and approach	-0.11
Physical influences	
ADHD	-0.90
ADHD – treatment with drugs	0.32
Breastfeeding	0.04
Deafness	-0.61
Exercise/relaxation	0.26
Gender on achievement	0.08
Lack of illness	0.26
Lack of sleep	-0.05
Full compared to pre-term/low birth weight	0.57
Relative age within a class	0.45

CURRICULA	ES
Reading, writing and the arts	
Comprehensive instructional programs for teachers	0.72
Comprehension programs	0.47
Drama/arts programs	0.38
Exposure to reading	0.43
Music programs	0.37
Phonics instruction	0.70
Repeated reading programs	0.75
Second/third chance programs	0.53
Sentence combining programs	0.15
Spelling programs	0.58
Visual-perception programs	0.55
Vocabulary programs	0.62
Whole language approach	0.06
Writing programs	0.45
Math and sciences	
Manipulative materials on math	0.30
Mathematics programs	0.59
Science programs	0.48
Use of calculators	0.27
Other curricula programs	
Bilingual programs	0.36
Career interventions	0.38
Chess instruction	0.34
Conceptual change programs	0.99
Creativity programs	0.62
Diversity courses	0.09
Extra-curricula programs	0.20
Integrated curricula programs	0.47
Juvenile delinquent programs	0.12
Motivation/character programs	0.34
Outdoor/adventure programs	0.43
Perceptual-motor programs	0.08
Play programs	0.50
Social skills programs	0.39
Tactile stimulation programs	0.58

HOME	ES
Family structure	
Adopted vs non-adopted care	0.25
Engaged vs disengaged fathers	0.20
Intact (two-parent) families	0.23
Other family structure	0.16
Home environment	
Corporal punishment in the home	-0.33
Early years' interventions	0.44
Home visiting	0.29
Moving between schools	-0.34
Parental autonomy support	0.15
Parental involvement	0.50
Parental military deployment	-0.16
Positive family/home dynamics	0.52
Television	-0.18
Family resources	
Family on welfare/state aid	-0.12
Non-immigrant background	0.01
Parental employment	0.03
Socio-economic status	0.52

SCHOOL	ES
Leadership	
Collective teacher efficacy	1.57
Principals/school leaders	0.32
School climate	0.32
School resourcing	
External accountability systems	0.31
Finances	0.21
Types of school	
Charter schools	0.09
Religious schools	0.24
Single-sex schools	0.08
Summer school	0.23
Summer vacation effect	-0.02
School compositional effects	
College halls of residence	0.05
Desegregation	0.28
Diverse student body	0.10
Middle schools' interventions	0.08
Out-of-school curricula experiences	0.26
School choice programs	0.12
School size (600-900 students at secondary)	0.43
Other school factors	
Counseling effects	0.35
Generalized school effects	0.48
Modifying school calendars/timetables	0.09
Pre-school programs	0.28
Suspension/expelling students	-0.20

The Visible Learning research synthesises findings from **1,400** meta-analyses of **80,000** studies involving **300** million students, into what works best in education.

Key for rating

- Potential to considerably accelerate student achievement
- Potential to accelerate student achievement
- Likely to have positive impact on student achievement
- Likely to have small positive impact on student achievement
- Likely to have a negative impact on student achievement

ES Effect size calculated using Cohen's *d*



visible learning^{plus}

Visible Learning^{plus} 250+ Influences on Student Achievement

CLASSROOM	ES
Classroom composition effects	
Detracking	0.09
Mainstreaming/inclusion	0.27
Multi-grade/age classes	0.04
Open vs. traditional classrooms	0.01
Reducing class size	0.21
Retention (holding students back)	-0.32
Small group learning	0.47
Tracking/streaming	0.12
Within class grouping	0.18
School curricula for gifted students	
Ability grouping for gifted students	0.30
Acceleration programs	0.68
Enrichment programs	0.53
Classroom influences	
Background music	0.10
Behavioral intervention programs	0.62
Classroom management	0.35
Cognitive behavioral programs	0.29
Decreasing disruptive behavior	0.34
Mentoring	0.12
Positive peer influences	0.53
Strong classroom cohesion	0.44
Students feeling disliked	-0.19

TEACHER	ES
Teacher attributes	
Average teacher effects	0.32
Teacher clarity	0.75
Teacher credibility	0.90
Teacher estimates of achievement	1.29
Teacher expectations	0.43
Teacher personality attributes	0.23
Teacher performance pay	0.05
Teacher verbal ability	0.22
Teacher-student interactions	
Student rating of quality of teaching	0.50
Teachers not labeling students	0.61
Teacher-student relationships	0.52
Teacher education	
Initial teacher training programs	0.12
Micro-teaching/video review of lessons	0.88
Professional development programs	0.41
Teacher subject matter knowledge	0.11

TEACHING: Focus on student learning strategies	ES
Strategies emphasizing student meta-cognitive/self-regulated learning	
Elaboration and organization	0.75
Elaborative interrogation	0.42
Evaluation and reflection	0.75
Meta-cognitive strategies	0.60
Help seeking	0.72
Self-regulation strategies	0.52
Self-verbalization and self-questioning	0.55
Strategy monitoring	0.58
Transfer strategies	0.86
Student-focused interventions	
Aptitude/treatment interactions	0.19
Individualized instruction	0.23
Matching style of learning	0.31
Student-centered teaching	0.36
Student control over learning	0.02
Strategies emphasizing student perspectives in learning	
Peer tutoring	0.53
Volunteer tutors	0.26
Learning strategies	
Deliberate practice	0.79
Effort	0.77
Imagery	0.45
Interleaved practice	0.21
Mnemonics	0.76
Note taking	0.50
Outlining and transforming	0.66
Practice testing	0.54
Record keeping	0.52
Rehearsal and memorization	0.73
Spaced vs. mass practice	0.60
Strategy to integrate with prior knowledge	0.93
Study skills	0.46
Summarization	0.79
Teaching test taking and coaching	0.30
Time on task	0.49
Underlining and highlighting	0.50

TEACHING: Focus on teaching/instructional strategies	ES
Strategies emphasizing learning intentions	
Appropriately challenging goals	0.59
Behavioral organizers	0.42
Clear goal intentions	0.48
Cognitive task analysis	1.29
Concept mapping	0.64
Goal commitment	0.40
Learning goals vs. no goals	0.68
Learning hierarchies-based approach	0.19
Planning and prediction	0.76
Setting standards for self-judgement	0.62
Strategies emphasizing success criteria	
Mastery learning	0.57
Worked examples	0.37
Strategies emphasizing feedback	
Classroom discussion	0.82
Different types of testing	0.12
Feedback	0.70
Providing formative evaluation	0.48
Questioning	0.48
Response to intervention	1.29
Teaching/instructional strategies	
Adjunct aids	0.32
Collaborative learning	0.34
Competitive vs. individualistic learning	0.24
Cooperative learning	0.40
Cooperative vs. competitive learning	0.53
Cooperative vs. individualistic learning	0.55
Direct instruction	0.60
Discovery-based teaching	0.21
Explicit teaching strategies	0.57
Humor	0.04
Inductive teaching	0.44
Inquiry-based teaching	0.40
Jigsaw method	1.20
Philosophy in schools	0.43
Problem-based learning	0.26
Problem-solving teaching	0.68
Reciprocal teaching	0.74
Scaffolding	0.82
Teaching communication skills and strategies	0.43

TEACHING: Focus on implementation method	ES
Implementations using technologies	
Clickers	0.22
Gaming/simulations	0.35
Information communications technology (ICT)	0.47
Intelligent tutoring systems	0.48
Interactive video methods	0.54
Mobile phones	0.37
One-on-one laptops	0.16
Online and digital tools	0.29
Programmed instruction	0.23
Technology in distance education	0.01
Technology in mathematics	0.33
Technology in other subjects	0.55
Technology in reading/literacy	0.29
Technology in science	0.23
Technology in small groups	0.21
Technology in writing	0.42
Technology with college students	0.42
Technology with elementary students	0.44
Technology with high school students	0.30
Technology with learning needs students	0.57
Use of PowerPoint	0.26
Visual/audio-visual methods	0.22
Web-based learning	0.18
Implementations using out-of-school learning	
After-school programs	0.40
Distance education	0.13
Home-school programs	0.16
Homework	0.29
Service learning	0.58
Implementations that emphasize school-wide teaching strategies	
Co- or team teaching	0.19
Interventions for students with learning needs	0.77
Student support programs – college	0.21
Teaching creative thinking	0.34
Whole-school improvement programs	0.28

Key for rating

- Potential to considerably accelerate student achievement
- Potential to accelerate student achievement
- Likely to have positive impact on student achievement
- Likely to have small positive impact on student achievement
- Likely to have a negative impact on student achievement

ES Effect size calculated using Cohen's *d*

The Visible Learning research synthesizes findings from **1,400** meta-analyses of **80,000** studies involving **300** million students, into what works best in education.

Bump It Up

Quad C

Quad D

Quad A

Quad B