WHAT

Knowledge (Awareness) (Remembering*)

It's about a strategy point that includes both the acquisition of information and the ability to recall information when needed.

Recalling information about the *subject, topic, competency,* or *competency area*; *recalling* the appropriate material at the appropriate time; students have to be *exposed* to and have *received* the information about the subject.

Find the information using a variety of resources.

* Bloom's Cognitive Taxonomy was revised in 1990's by one of his students, Lorin Anderson, to reflect & move action orientation to the levels of cognitive development.

WHO

Students Role:

- Read material
- Listen to lectures
- Watch videos
- Take notes
- Respond to "True/False", "Yes/No", "multiple choice", or "fill in the blank" questions to demonstrate *general knowledge* of the *subject*
- Respond to essay test/questions that use across course like describe, explain, define, list...
- Can locate information independently

Bottom line: "Can the student recall/access information?"

Teacher Role:

Sample Knowledge Tasks:

Define technical terms associated with the subject by stating their attributes, properties, or relations.
Recall the major facts about the subject.
Name the classes, sets, divisions, or arrangements that are fundamental to the subject.
List the criteria used to evaluate facts, data, principles, or ideas associated with the subject.
List the relevant principles and generalizations associated with the subject.
List the characteristic methods of approaching and presenting ideas associated with the subject (e.g., list the conventions or rules associated with the subject)
Describe the general problem solving method (i.e. the techniques and procedures) or the method(s) of inquiry commonly used in the subject area.

Sample Knowledge "action" verbs

define	tell	describe	know	relate	repeat	recognize
cite	sort	list	identify	name	match	collect
select	memorize	arrange	group	remember	state	recall
recite	locate	label	describe	underline	record	

HOW

Sample Knowledge *work products*?

Answers to Knowledge level quizzes ("True/False", "Yes/No", "fill in the blank", or "multiple choice") and essay questions that use verbs like describe, list, define...
Lists of definitions or relevant principles and generalizations associated with the subject.
Modifications of example problems presented in the textbook; for example, modest changes in numerical values or units; i.e. solutions to problems which were solved using "pattern recognition".
Make a mnemonic.
Write a list of what you can remember.
List all the _____ in the story.
Recite a poem.
Make a list of main events.
Make a mind map of what you know.
Make a timeline of events
Give an example
Make a facts chart.
State a definition.

Sample Knowledge Questions

Where is_____?
Why did _____?
When did _____?
Who/What was the main_____?
How did _____ happen? When did _____ happen?
How would you describe _____?
How would you explain _____?
What can you recall _____?
How would you show _____?
What is _____?
Who were the main _____?
Describe what happened after _____?
List the four main_____?
Where could you find_____?
Which one _____?
How is _____?
Can you select _____?
Who was _____?

WHAT

Comprehension (Understanding*) (Grasp Meaning)

It's about making use of information

Understanding what the facts mean using the ideas associated with the subject without relating them to other ideas or subjects and being able to follow and understand a discussion about the subject. This level requires at least some level of knowledge.

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WHO

Student Role:

- Solve textbook problems using appropriate techniques and procedures
- Translate ideas into their own words
- Read graphical or symbolic information (e.g., tables, diagrams, graphs, mathematical formulas, etc.) into verbal forms, and vice versa
- Interpret or summarize

Bottom line: Can the student EXPLAIN ideas or concepts?"

Teacher Role

Sample Comprehension Tasks:

Read textbook problems, understand what is required, and successfully solve the problems.
Clearly document the process used to solve the problem.
Clearly describe the solution to the problem.
Generalize based on the solution to the problem.
Restate an idea, theory, or principle in your own words.

Sample Comprehension "action" verbs

transform	change	restate	summarize	interpret	infer
discuss	describe	explain	review	report	contrast
illustrate	outline	paraphrase	relate	generalize	propose
expand upon	find example		give main idea		

HOW

What are typical Comprehension *work products*?

Answers to Comprehension level quizzes and exams ("multiple choice" or textbook problems).
Solutions to textbook problems which include (a) a summary of the learning objectives associated with the problem, (b) the problem statement in the form of a clearly labeled sketch, specifications, and what is required, (c) a description of the general solution method (techniques and procedures) used to solve the problem, and (d) a discussion of the solution.
Draw/Paint pictures to explain what an event was about
Give an analogy
Illustrate a main idea, poster, photograph
Draw a graph
Sequence the events in a flow chart, outline
Retell in your own words, paraphrase
Write a summary report

Sample Comprehension Questions

State _____ in your own words.

How would you rephrase _____?

Which facts or ideas show _____?

What is the main idea of _____?
How would you summarize _____?

What can you say about _____?

Which statements support _____?

Explain what is happening _____?
What is meant _____?

Which is the best answer _____?

WHAT

Application (Independent Problem Solving) (Applying*)

It's about being able to use in a new concrete situation

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WHO

Student Role:

Apply ideas, concepts, principles, theories, or general solution methods (techniques and procedures) that I learned at the Knowledge and Comprehension level to new situations

Solve problems in which the solution method is not immediately evident or obvious

Bottom Line: "Can the student USE the knowledge in another familiar situation?"

Teacher Role:

What does the teacher do at this level?

The teacher assigns problems that do not explicitly (or as best possible implicitly) imply the use of an expected solution methodology. The teacher may develop problems and assignments in conjunction with teachers in another related subject area. The teacher will probe for use of course material outside of the course.

Sample Application Tasks:

____Solve problems which require that the student recognize and apply the appropriate ideas, concepts, principles, theories, general solution methods (techniques and procedures), etc. without being told and without any specific or immediate context or cues.

____Apply the laws of mathematics, chemistry, and physics, as well as engineering, business or design concepts, etc. to practical problems or situations.

____Solve problems associated with design/build projects.

Sample Application "action" verbs

apply	practice	employ	develop
dramatize	schedule	operate	solve
use	demonstrate	translate	employ
construct	model	interpret	build
show	plan	put to use	experiment with

HOW

What are typical *work products*?

Application level work products are very similar to Comprehension level work products; however, documentation will be included which demonstrates that the learner recognized the need to use ideas, concepts, principles, theories, general solution methods (techniques and procedures), etc. in a new situation.

Construct a model to show how it works

Make a puzzle game using ideas from event

Develop a presentation that shows how it applies to another situation

Develop a metaphor

Make a prediction

Sample Application Questions

How would you use_____?

What examples can you find to _____?

How would you solve _____ using what you've learned _____?

How would you organize _____ to show _____?

How would you show your understanding of _____?

What approach would you use to _____?

How would you apply what you learned to develop _____?

What other way would you plan to _____?

What would result if _____?

Use the facts to _____?

What elements would you choose to change _____?

What facts would you select to show _____?

What questions would you ask in an interview with _____?

WHAT

Analysis (Logical Order, Components) (Analyzing*)

Break into pairs – see relationships

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WHO

Student Role:

It's about being able to:

- Explain why
- Methodically examine ideas, concepts, principles, theories, general solution methods (techniques and procedures), reports, etc. and separate these into their component parts or basic elements
- Use the results of this examination to clarify the organization of the whole or to gain a global view. This level requires Knowledge and Comprehension Levels of Learning; Application is not required.
- Explain the logical interconnections of the parts
- Develop detailed cause and coming up with a conclusion
- Can explain "Why I did what I did"

Bottom Line: "Can the student DIFFERENTIATE between constituent parts and make logical conclusions?"

Teacher Role:

The teacher probes, guides, observes, and acts as a resource or facilitator.

Sample Analysis Tasks:

Determine what are the causal relationships between the parts and how the whole functions?
Explain, from the parts, why the whole does or does not work?
Examine the conclusions, determine if it is supported by sound reasoning?
Construct the evidence provided support the hypothesis or the conclusion?
Support the conclusions supported by facts, opinions, or an analysis of the results?
Determine if there are any unstated assumptions?

Sample Analysis "action" verbs?

analyze	dissect	detect	classify	assumptions
make inference	distinguish	examine	survey	relate
construct support	identify assumptions		investigate	separate
categorize	test	identify theme		
identify similarities/differences				

HOW

What are typical *work products*?

Answers to Analysis level exams (problems and essays).
Analysis level work products are very similar to Comprehension level work products; however, documentation will include a more extensive discussion of the work and a conclusion. The content, amount, depth and a conclusion of the presentation is what distinguishes Analysis level work products from Comprehension level work products.
Design a questionnaire to gather further information and make a decision from data
Write a commercial to sell a new product
Conduct an investigation to gather information, supporting a point of view
Illustrate data/information with a graph and use that info somehow
Produce a Venn diagram

Sample Analysis Questions

What are the parts or features of _____?

How is _____ related to _____?

What is the theme _____?

What motive is there _____?

If you were to ask to list the part what would be on your list _____?

What inference can you make _____?

What conclusions can you draw _____?

How would you classify _____?

What evidence can you find _____?

What is the relationship between _____?

What is the distinction between _____?

What is the pattern_____?

What is the function of _____?

What idea justify _____?

WHAT

Synthesis (Create) (Creating*)

Two different sources of knowledge & understanding about XYZ are integrated and a conclusion formed
Invent a new item, solve a problem based on learning, decide how to communicate

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WHO

Student Role:

It's about being able to:

- Assemble parts and elements into a unified organization or whole that requires original or creative thinking
- Recognize new problems and develop new tools to solve them
- Create original plans, models, hypotheses, etc. for constructing solutions to problems. This Level of Learning requires Knowledge, Comprehension, Application and Analysis Levels of Learning.
- Generate ideas and use them to create a physical object, a process, a design method, a written or oral communication, or even a set of abstract relations (e.g., mathematical models)
- Produce written or oral reports that have the desired effect (e.g., information acquisition, acceptance of a point of view, continued support, etc.) on the reader or listener
- Generate project plans
- Propose designs
- Formulate hypotheses based on the analysis of relevant or pertinent factors
- I am able to generalize from a set of axioms or principles.

Teacher Role:

The teacher reflects, extends, analyzes through effective questioning, and evaluates.

Sample Synthesis Tasks
Create a project plan on own
Develop a model on own
Propose a design on own

Sample Synthesis "action" verbs

create	invent	compose	modify	imagine	elaborate
combine	estimate	formulate	predict	propose	organize
originate	change	adapt	suppose	make up	plan
construct	design	improve	produce	set up	what if
develop					

HOW

What are typical *work products*?

Answers to Synthesis level exams (problems, and essays).
Synthesis level work products are very similar to Comprehension level work products; however, documentation will include a more extensive discussion of the work and a conclusion. The content, amount, and depth of the presentation is what distinguishes Synthesis level work products from Comprehension level work products.
Compose a rhythm
Devise a way to....
Sell an idea
Write your prediction about how views on this topic would change in time or place
Invent a machine for a specific task
Create a new product
Do a visual presentation on a "new" version or angle connected to the topic
Set goals from your learning

Sample Synthesis Questions

What changes would you make to solve___?
How would you improve _____?
What would happen if you combined_____?
Elaborate on the reason _____?
Propose an alternative _____?
Invent _____?
How would you adapt _____ to create a different ___?
How could you change (modify) the plot (plan) ___?
What could be done to minimize (maximize) _____?
What way would you design _____?
What could be combined to improve (change) ___?
Suppose you could _____ what would you do _____?
How would you test _____?
Formulate a theory for _____?
Predict the outcome if _____?
How would you estimate the results for ____?
What facts can you compile ____?
Construct a model that would change ____?
Can you think of an original way for the ____?

WHAT

Evaluate (Evaluation*)

Judge value and purpose, support with relevant criteria

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WHO

Student Role:

It's about being able to:

- Judge and appreciate the value of ideas, concepts, principles, theories, or general solution methods (techniques and procedures) using appropriate criteria. This level requires Knowledge, Comprehension, Application, Analysis, and Synthesis Levels of Learning.
- Make value judgments based on specific criteria such as usefulness and effectiveness
- Rationally select a process, a method, a model, a design, etc. from among a set of possible processes, methods, models, designs, etc. based on information gained through application, analysis, and synthesis
- Evaluate competing plans of action before actually starting the work
- Evaluate work products based on internal standards of consistency, logical accuracy, and the absence of internal flaws
- Certify that the feasibility of a design has been demonstrated in a report
- Evaluate work products based on standards of efficiency, cost, or utility to meet particular goals or objects

Bottom Line: "Can the student JUSTIFY a decision or course of action?"

Teacher Role:

The teacher clarifies, probes, harmonizes, aligns, and guides.

Sample Tasks

Evaluate an idea in terms of...
For what reasons do I favor...?
Which policy do I think would result in the greatest good for the greatest number?
Which of these models or modeling approaches is the best for my current needs?
How does this report demonstrate that the design is feasible?
How does this report demonstrate the quality of the design?

Sample Evaluation "action" verbs?

appraise	assess	choose	rate value	select
rule on	prioritize	probe	opinion	value
award	decide	argue/debate	predict (quality)	evaluate
judge	defend	justify	recommend	rank
estimate (quality)				

HOW

Sample Evaluation *work products*?

Answers to Evaluation level exams (problems and essays)
Evaluation level work products are very similar to Comprehension level work products; however, documentation will include a more extensive discussion of the work around a specific set of criteria leading to a conclusion. The content, amount, and depth of the presentation is what distinguishes Evaluation level work products from Comprehension level work products.
Conduct a PMI (plus, minus interesting)
Write a letter outlining changes that will be needed to be made on...
Hold a discussion about viewpoints
Present your point of view
Prepare and use a list of criteria to judge a show, document, presentation
Conduct a debate about an issue of special interest
Evaluate the composition (art/music) that you or others performed based on an agreed upon criteria
Make a recommendation

Sample Evaluation Questions

Do you agree with the actions ____? With the outcome _____?
What is your opinion of _____?
How would you prove _____? Disprove _____?
Assess the value or importance of _____?
Would it be better if _____?
Why did they (the character) choose _____?
What would you recommend ____?
How would you rate the _____?
What would you cite to defend the actions _____?
How would you evaluate _____?
How could you determine _____?
What choice would you have made _____?
What would you select _____?
How would you prioritize _____?
What judgment would you make about _____?
Based on what you know, how would you explain _____?
What information would you use to support the view _____?
How would you justify _____?
What data was used to make the conclusion _____?
Why was it better than _____?
How would you prioritize the criteria _____?
How would you evaluate the ideas _____? people_____?