

Capacity Matrix Explanation

The Capacity Matrix¹ is a Quality Learning Tool designed and developed by David Langford and Dr. Myron Tribus. It is a charting technique (see example on previous page) that breaks down Aims/Outcomes into specific competencies/capacities to be developed and shows the different levels of learning (knowledge) achieved.

Adapted for use by the Mt. San Antonio College PhotoGraphics faculty, it begins as an individual's self-assessment tool. It is a method to ensure quality and return the responsibility for learning to the individual. Students evaluate the quality of their work in comparison to levels of learning and understanding. The instructor can then use this assessment information to determine the effectiveness of the learning system and chart individual student's skills in a Capacity Matrix of Industry needs.

Capacity – 1a. The ability to receive, hold, or absorb. 1b. A measure of this ability; volume. 2. The maximum amount that can be contained. 3a. Ability to perform or produce; capability. 3b. The maximum or optimum amount that can be produced. 4. The power to learn or retain knowledge; mental ability. 5. Innate potential for growth, development, or accomplishment;

faculty.

The Capacity Matrix is a cumulative assessment of student progress; not a static assessment of level/course achievement. Each shaded level on the matrix indicates the best estimation of the individual's current learning. The assessment process is based on continual analysis and reflection.

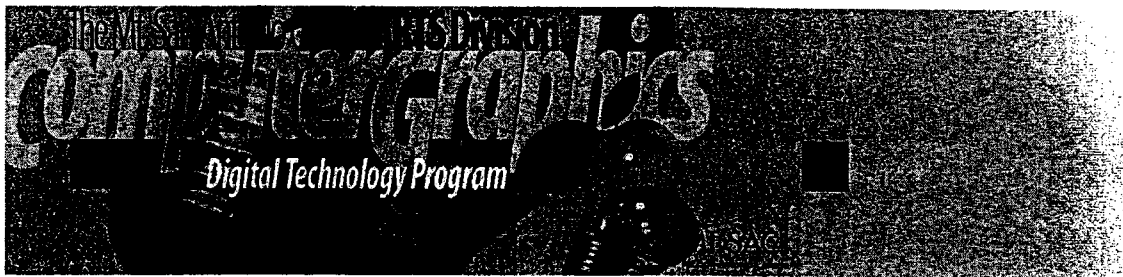
Each level shaded in on the matrix must be accompanied by portfolio in the form of Documentation, Demonstration, or Defense--The 3Ds. Capacities from several areas can be demonstrated in just one documented project.

Other Uses

The Capacity Matrix can also be a very effective component of a Student Portfolio. The PhotoGraphics faculty at Mt. San Antonio College have developed a binder/portfolio approach used with program majors that utilizes the Capacity Matrix; and charts student skills development against the requirements of prospective industry careers.

Where "letter-grading" is a prescribed or mandated assessment outcome, using the Capacity Matrix focuses the outcome of student performance on the quality of learning and understanding not "testing."

¹ © 1999 Langford International, Inc. Methodology presented in the *Quality Learning Training Manual*, David Langford, Molt, Montana.



Assessment and Learning Levels

Data and Awareness

Level 1: INFORMATIONAL

How do I know I'm at this level?

Can I recall information? Can I bring to mind the appropriate material at the appropriate time? Have I been exposed to the information, and can I respond to questions tasks etc?

What do I do at this level?

Research, read material, listen to lectures, watch videos and take notes. I am able to pass a test (3Ds) of knowledge on the subject area.

How will the instructor know I am at this level?

The instructor will ask questions, (either orally or in written tests), regardless of complexity, that can be answered through simple recall of previously learned material.

What does the instructor do at this level?

Directs, tells, shows, and/or examines the information necessary at this level.

What are typical ways I can demonstrate my knowledge?

Name.

List, Tell,

Define

Who? When? What?

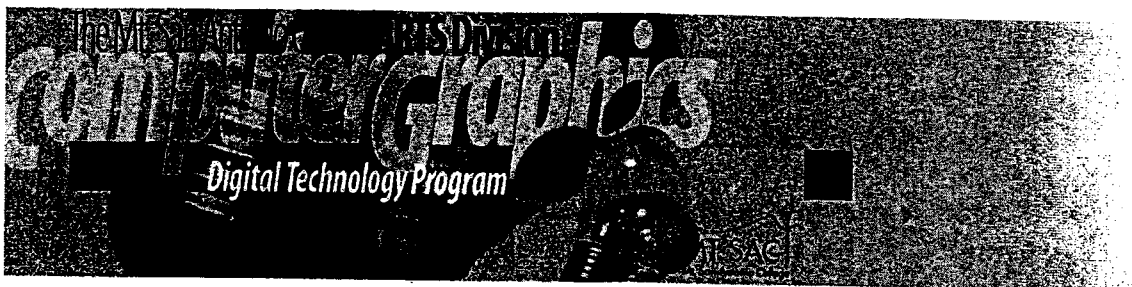
Yes or No questions: e.g., "Did...?" "Was...?" "Is...?"

How many? How much?

Recall or identify terminology.

What did the book say?

Do I know the meaning of the "key words?"



Assessment and Learning Levels
Understanding and Comprehension

Level 2: Knowledge

How do I know I am at this level?

This level requires information. I comprehend and understand what is being communicated, and make use of the ideas without relating them to other ideas or material. I may not yet understand the fullest meaning.

Do I understand what others are discussing concerning this idea? Can I explain it to others?

Knowledge process verbs:

define, repeat, list,
name, label, memorize,
record, recall, relate

What do I do at this Level?

I explain the idea or theory either in written or oral form. I translate information into my own words. I can make an example and demonstrate learning. I can interpret what the instructor is saying or what is being communicated. I can do textbook assignments. I can recognize and extract information.

How will the instructor know I am at this level?

This instructor will often ask questions or give tests that can be answered by merely restating or reorganizing material in a rather literal manner (clearly stating the facts or primary meaning of the material) to show that I understand the essential meaning (e.g., "Express the ideas in your own words.").

What does the instructor do at this level?

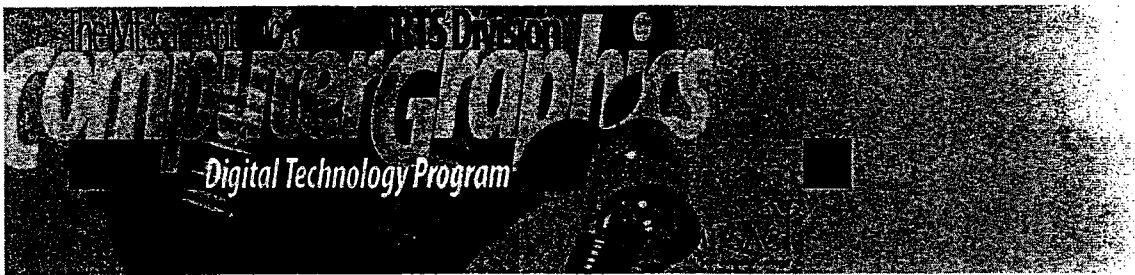
The instructor demonstrates, listens, questions compares, contrasts, and examines the information and the learner's knowledge of it.

Comprehension process verbs:

restate, describe,
explain, identify, report,
tell, discuss, recognize,
express, locate,
and review.

What are typical ways I can demonstrate, or show on my own, my comprehension and understanding?

Give an example.
What is the most important idea?
What will probably happen?
What caused this?
Compare. (What things are the same?)
Contrast. (What things are different?)
Why did you say that?
Give the idea in you own words
Do I understand the terminology?



Assessment and Learning Levels
Analysis and Application
Level 3: KNOW-HOW

How do I know I am at this level?

Analysis: (logical ordering, components)

I can methodically examine ideas, concepts, writing, etc., and separate them into parts or basic principles. I have the ability to break down information into component parts in order to make organization of the whole clear.

Work at this level usually requires, but is not limited to previous information, knowledge, and application.

Application: (solving the problem)

I have the ability to use ideas, methods, concepts, principles, and theories in new situations. I know and comprehend the information and can apply it to a new situation without being told. I also have the ability to recognize when a certain task, project, theory, or concept is beyond my current capacity.

What do I do at this level?

Analysis: (logical ordering, components)

I analyze the application and understanding of knowledge by breaking it apart. I can explain each of the parts. I know how, and when, to put the parts together so that the organization of the whole idea becomes clear. I discuss, uncover, list and dissect.

Application: (solving the problem)

I take knowledge that has been learned and apply this knowledge to a new situation. I solve problems on my own, and make use of other techniques. I also recognize new problems and develop new tools to solve them.

This requires not only knowing and comprehending information, but deep thinking about the usefulness of this information, and how it can be used to solve new problems that I create or identify.

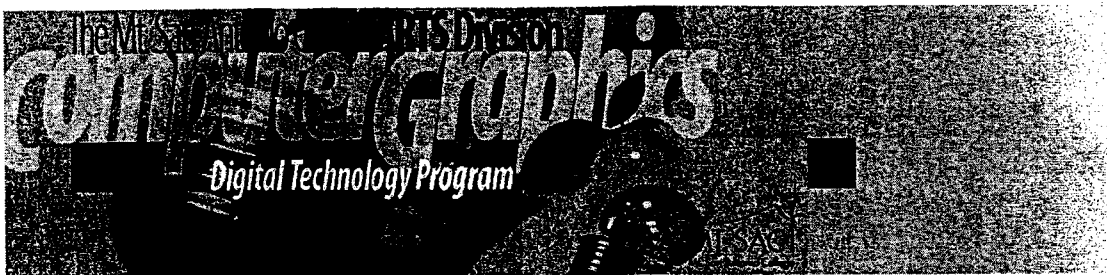
How will the instructor know I am at this level?

Analysis:

I can demonstrate, often by a written document, that I can break an idea into its component parts for logical analysis: assumptions, facts, opinions, logical conclusions, etc. I can demonstrate a logical order to solve a problem, or solve a new problem using induction, deductions, or cause and effect processes.

Analysis process verbs:
translate, apply, employ, use, practice, shop, interpret, demonstrate, dramatize, illustrate, operate, and schedule.

Application process verbs:
distinguish, criticize, debate, question, experiment, compare, diagram, inspect, inventory, and relate.



Assessment and Learning Levels

Analysis and Application

Level 3: KNOW-HOW (continued from page 4)

Application:

I will show the instructor through my work that I am involved in problem solving in new situations with minimal identification or prompting of the appropriate rules, principles, or concepts. The instructor will be able to ask questions like, "How much protection from the sun is enough?"

Applications questions that students pose for themselves are similar to interpretation questions in that students have to use an idea learned previously to solve a new problem. However, in application students use an idea not when told to do so, but when the problem demands it. This involves a transfer of learning and knowledge to a new situation.

What does the instructor do at this level?

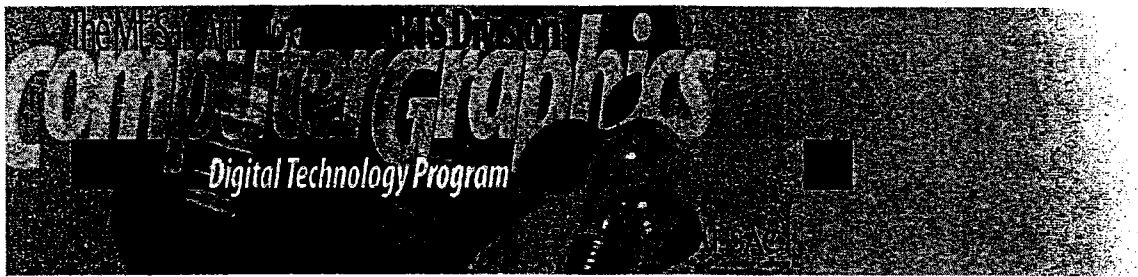
The instructor shows, facilitates, probes, observes, critiques work being done by the student, and acts as a resource.

What are typical questions which I can pose to myself that will demonstrate, or show, my analysis?

What reason does he/she give for the conclusions?
What method is he/she using to convince you?
What does the author seem to believe?
What words indicate bias or emotion?
Does the evidence give support the conclusion?

What are typical ways I can demonstrate or show, on my own, my application?

Solve.
How can I find an answer to...?
Apply the generalization to...



Assessment and Learning Levels
Synthesis, Judgement and Evaluation
Level 4: Wisdom & Mastery

How do I know I am at this level?

Synthesis: (why?, interrelationships)

I have the ability to put together parts and elements into a unified organization or whole which requires original, creative thinking. I can also recognize new problems, and develop new tools to solve them. I can now create my own plan, model, and hypothesis for finding solutions to problems. I understand why components work together to create something new.

Judgement: (discernment)

I understand when it is appropriate to apply learned knowledge to a new application. I know when using my knowledge in this area might hurt others unnecessarily, or when the application of this knowledge is vital for moving ahead.

Evaluation: (appreciation/value)

I have the ability to judge and appreciate the value of ideas, procedures, and methods, using appropriate criteria. To work at this level, it is helpful to have previous levels of learning.

Synthesis process verbs:

compose, propose, formulate, assemble,
construct, set up, manage, plan, design,
arrange, collect, create, organize,
and prepare

Judgement process verbs: compare,
assess, reflect, study, observe, correlate,
focus, and think.

Evaluation process verbs:

judge, evaluate, compare, score, choose,
estimate, predict, appraise, rate, value,
select, assess, measure.

What do I do at this level?

Synthesis:

I put ideas together to create something. This could be a physical object, a communication, or even a set of abstract relations. I discuss, generalize, relate, compare, contrast, or formulate abstracts.

Judgement:

I study situations carefully and weigh the consequences of applying either this information or other knowledge and know-how I have acquired.

Evaluation:

I must make value judgments based on certain considerations such as usefulness, effectiveness, and so on. I am able to write editorials presenting my viewpoint substantiated with facts, theories, observations, etc. I can discuss or debate an issue with information gained through applications, analysis, and synthesis to back up my viewpoint.



Assessment and Learning Levels

Synthesis, Judgement and Evaluation

Level 4: Wisdom & Mastery (continued from page 6)

How will the instructor know I am at this level?

I show that I can combine ideas into a statement, a plan, product, etc., that is new for me: e.g. Can I develop a program that includes the best parts of each of those ideas?

I show examples, or explain how I knew when it was most appropriate to use this information.

I can demonstrate that I can make a judgment about something using a set of criteria or standards for making the judgment.

What does the instructor do at this level?

The instructor reflects, extends, analyses, and evaluates, clarifies, accepts, harmonizes, and guides.

The instructor offers suggestions and asks leading questions which help me think about the appropriate use of knowledge.

The typical questions I can answer which will demonstrate or show my ability and understanding of:

Synthesis:

Can I create a plan?

Can I develop a model?

Can I combine those parts?

Judgement:

Can I recognize when I am in a situation requiring the application of previous knowledge?

Can I apply information and study the appropriateness of my decision?

Can I be pro-active in using my knowledge?

Evaluation:

I can 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?

I can compare and contrast the relative merits of ideas or concepts.

Without the Learning Tool...

Students attend lectures and demonstrations of techniques in classes. They are also given reading and writing assignments and skills-based instruction; preparing "projects" which reflect specific skills and practice.

Assessing student knowledge and competencies in this process is very subjective and most students are encouraged to "paint by numbers" or mimic assumed good examples.

Students are not focused on why they chose a certain problem-solving strategy or are using a specific set of skills to solve the design problem. They are instead focused on the overall grade.

Achievement is measured by a traditional teacher testing and inspection grading process. Students continue to depend upon an "inspection" of their work and a letter grade to represent the quality of their experience.

Sample portfolios assembled by students and used for job interviews are often collections of class "A" projects; static assessments of level/course achievement and not actually indicative of the student's levels of learning and understanding.



With the Learning Tool...

At the course level students evaluate the quality of their work and assess their progress towards a mastery of knowledge and skills.

The matrix focuses students on the quality of their respective competencies, capacities, and abilities – not grades; and these in turn can then be compared with the requirements of prospective industry careers.

Student performance is driven by the quality of their overall learning and understanding. They work on projects to further and improve their capacities in many different areas. They control the effectiveness of the learning system.

Portfolio projects grow out of a need to exhibit the student's levels of development in many different areas of interest and capacity and not just technological skills.

Projects now focus on student abilities to put ideas together which require original, creative thinking; study situations and weigh the consequences of applying knowledge or know-how.

Project and Capacity Matrix: Vera Parra

- Capacity – 1a. The ability to receive, hold, or absorb. 1b. A measure of this ability; volume.*
- 2. The maximum amount that can be contained. 3a. Ability to perform or produce; capability. 3b. The maximum or optimum amount that can be produced.*
- 4. The power to learn or retain knowledge; mental ability.*
- 5. Innate potential for growth, development, or accomplishment; faculty.*



				LEARNING PROCESS						The 3 D's			
				INFORMATION	KNOWLEDGE	KNOW-HOW		WISDOM					
				Data	Understanding & Comprehension	Analysis	Application	Synthesis	Judgement	Application/Evaluation	Document	Demonstrate	Defend
AIM	CAPACITIES	CAPACITY BREAKDOWN	TOTAL	This is a cumulative assessment of your course progress; not a static assessment. Each shaded level of this matrix should indicate your best estimation of your current learning. Each level shaded must be accompanied by portfolio in the form of (1) Documentation, (2) Demonstration, or (3) Defense.									
			40										
Essential Logical Skills			1										
			2										
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	Idea Strategies	Develop Story Topics	23										
		Storyboarding Techniques	24										
		Topic Research	25										
		Synthesizing	26										
	Task Oriented group model	Orientation Stage	27										
		Planning stage	28										
		Exploring	29										
		Action	30										
	Interpersonal model	Termination and Implementation	31										
		Communication	32										
		Analysis and Problem Solving	33										
		Valuing	34										
	Fundamental Abilities	Social Interaction	35										
		Effective Citizenship	36										
		Aesthetic Response	37										
		Examination	38										
		Synthesizing	39										
		Termination and Implementation	40										