APPENDIX A

Taxonomies of Learning Domains

Activities at Various Cognitive Levels of Learning (LoL)

Bloom's taxonomy of learning objectives is used to define how well a skill or competency is learned or mastered. A fuller description of Bloom's taxonomy is given in the following pages but a brief summary of the activities associated with each level is given below.

1. At Knowledge Level of Learning a student can define terms
2. At Comprehension Level of Learning a student can work assigned problems and can example what they did
3. At Application Level of Learning a student recognizes what methods to used and then used the methods to solve problems
4. At Analysis Level of Learning a student can explain why the solution process works
5. At Synthesis Level of Learning a student can combine the part of a process in new and useful ways
6. At Evaluation Level of Learning a student can create a variety of ways to solve the problem and then, based on established criteria, select the solution method best suited for the problem.

KNOWLEDGE (INFORMATION)

1. How do **I know** I have reached this level?

   I can recall information about the *subject, topic, competency,* or *competency area*; I can *recall* the appropriate material at the appropriate time. I have been *exposed* to and have *received* the information about the subject; thus, I can respond to questions, perform relevant tasks, etc.

2. What do **I do** at this level?

   I read material, listen to lectures, watch videos, take notes; I pass 'True/False', 'Yes/No', 'multiple choice', or 'fill in the blank' tests which demonstrate my *general knowledge* of the *subject*. I learn the vocabulary or terminology as well as the conventions or rules associated with the *subject*.

3. How will the **teacher know** I am at this level?

   The teacher will provide *verbal* or *written* tests on the *subject* that can be answered by simply *recalling* the material I have learned about this subject.

4. What does the **teacher do** at this level?

The teacher directs, tells, shows, identifies, examines the subject or competency area *at this level*.

5. What are typical ways **I** can demonstrate my knowledge?
    a. Answer 'True/False', 'Yes/No', 'fill in the blank', or 'multiple choice' questions correctly.
    b. Define technical terms associated with the subject by stating their attributes, properties, or relations.
    c. Recall the major facts about the subject.
    d. Name the classes, sets, divisions, or arrangements that are fundamental to the subject.
    e. List the criteria used to evaluate facts, data, principles, or ideas associated with the subject.
    f. List the relevant principles and generalizations associated with the subject.
    g. List the characteristic methods of approaching and presenting ideas associated with the subject (e.g., list the conventions or rules associated with the subject).
    h. Describe the general problem solving method (i.e., the techniques and procedures) or the method(s) of inquiry commonly used in the subject area.

6. What are typical ***work products***?
    a. Answers to Knowledge level quizzes ('True/False', 'Yes/No', 'fill in the blank', or 'multiple choice').
    b. Lists of definitions or relevant principles and generalizations associated with the subject.
    c. 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'.

7. What are descriptive **'process' verbs**?

define	label	listen	list	memorize	name
read	recall	record	relate	repeat	view

COMPREHENSION (UNDERSTANDING)

1. How do **I know** I have reached this level?

   I comprehend or understand the *subject, topic, competency,* or *competency area;* I use ideas associated with the subject without relating them to other ideas or subjects. I may not yet completely understand the subject. When others are discussing this subject, I can follow and understand the discussion. This level requires **Knowledge**.

2. What do **I do** at this level?

I successfully solve textbook problems using appropriate techniques and procedures based on (**1**) where the problem is located in the book or (**2**) the problem statement. I translate ideas into my own words (translation from one level of abstraction to another). I translate graphical or symbolic information (e.g., tables, diagrams, graphs, mathematical formulas, etc.) into verbal forms, and vice versa. I interpret or summarize communications (oral/written/graphical). I can use the problem solution to determine effects, trends, implications, corollaries, etc.

3. How will the **teacher know** I am at this level?

   The teacher will ask questions that can be answered by restating or reorganizing material in a literal manner; i.e., by clearly stating facts or the principle meaning of the material in your own words. The teacher will also give tests based on the textbook problems that were (**1**) assigned as homework **or** (**2**) used as examples in the textbook or in class.

4. What does the **teacher do** at this level?

   The teacher demonstrates, solves problems, listens, questions, compares, contrasts, and examines the information and your knowledge of the subject.

5. What are typical ways **I** can demonstrate, on my own, my comprehension and understanding?
   a. Read textbook problems, understand what is required, and successfully solve the problems.
   b. Clearly document the process used to solve the problem.
   c. Clearly describe the solution to the problem.
   d. Draw conclusions based on the solution to the problem.
   e. Compare/contrast two different textbook problems (i.e., what elements are the same? what elements are different?).
   f. Restate an idea, theory, or principle in your own words.

6. What are typical **work products**?
   a. Answers to Comprehension level quizzes and exams ('multiple choice' or textbook problems).
   b. 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.

7. What are descriptive **'process' verbs**?

describe	discuss	explain	express	identify	locate
recognize	report	restate	review	solve	tell

APPLICATION (INDEPENDENT PROBLEM SOLVING)

1. How do I know I have reached this level?

   I can recognize the need to use an idea, concept, principle, theory, or general solution methods (techniques and procedures) **without being told** and **without any specific or immediate context or cues.** For example, I do not need to locate a similar example in a textbook, nor do I need to know that an assignment is for a particular course in order to recognize the need to use a particular idea, etc. I know and comprehend these ideas, concepts, principles, theories, or general solution methods (techniques and procedures and I can apply them to new situations. I also have the ability to recognize when a certain task or project is beyond my current competency. This level requires **Knowledge** and **Comprehension**.

2. What do I do at this level?

   I apply ideas, concepts, principles, theories, or general solution methods (techniques and procedures) that I learned at the Knowledge and Comprehension level to new situations. I solve problems in which the solution method is not immediately evident or obvious. I solve these problems independently and make use of other techniques and procedures as well. This requires not only knowing and comprehending these ideas, concepts, principles, theories, and general solution methods (techniques and procedures) but deep thinking about their usefulness and how they can be used to solve new problems that I identify or define.

3. How will the teacher know I am at this level?

   The teacher will review my work products and confirm that I am solving problems independently, in new situations, and without prompting by the teacher. The teacher will be able to pose general questions such as *"How much protection from the sun is enough?"* and I will know how to answer the question by defining and solving a problem.

4. 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 areas. The teacher will probe for use of course material outside of the course.

5. What are the typical ways **I** can demonstrate, on my own, my Application of Knowledge and Comprehension?
   a. Solve problems which require that I 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.
   b. Apply the laws of mathematics, chemistry, and physics, as well as engineering, business or design concepts, etc. to practical problems or situations.
   c. Solve problems associated with design/build projects.

6. 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 you recognized the need to use ideas, concepts, principles, theories, general solution methods (techniques and procedures), etc. in a new situation.

7. What are descriptive **'process' verbs**?

apply	demonstrate	employ	illustrate	interpret
operate	practice	recognize	solve	use

ANALYSIS (LOGICAL ORDER, COMPONENTS)

1. How do I know I have reached this level?

   I can explain why. I can methodically examine ideas, concepts, principles, theories, general solution methods (techniques and procedures), reports, etc. and separate these into their component parts or basic elements. I can 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.

2. What do I do at this level?

   I demonstrate that I can analyze results by breaking ideas, concepts, principles, theories, general solution methods (techniques and procedures), reports, etc. into their component parts. I explain the logical interconnections of the parts. I can also develop detailed cause and effect sequences.

3. How will the teacher know I am at this level?

   When asked, I am able to explain why I did what I did. I include a discussion with my work that explains why my solution method worked.

4. What does the teacher do at this level?

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

5. What are typical questions I can ask myself that will demonstrate my Analysis Level of Learning?
   a. What are the causal relationships between the parts and how the whole functions?
   b. Can I explain, from the parts, why the whole does or does not work?
   c. Are the conclusions supported by sound reasoning?
   d. Does the evidence provided support the hypothesis or the conclusion?
   e. Are the conclusions supported by facts, opinions, or an analysis of the results?

f. What are the unstated assumptions, if any?

6. What are typical work products?
   a. Answers to Analysis level exams (problems, multiple choice, and essays).
   b. Analysis level work products are very similar to Comprehension level work products; however, documentation will include a more extensive discussion of the work. The content, amount, and depth of the presentation is what distinguishes Analysis level work products from Comprehension level work products; e.g., see items a. through f. above.

7. What are descriptive 'process' verbs?

analyze	appraise	break apart	break down	calculate
compare	contrast	debate	diagram	differentiate
examine	experiment	explain	inspect	inventory
question	relate	solve		

SYNTHESIS (CREATE)

1. How do I know I have reached this level?

   I have the ability to assemble parts and elements into a unified organization or whole that requires original or creative thinking. I recognize new problems and develop new tools to solve them. I create my own plans, models, hypotheses, etc. for constructing solutions to problems. This Level of Learning requires Knowledge, Comprehension, Application and Analysis Levels of Learning.

2. What do I do at this level?

   I 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). I 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. I generate project plans. I propose designs. I formulate hypotheses based on the analysis of relevant or pertinent factors. I am able to generalize from a set of axioms or principles.

3. How will the teacher know I am at this level?

I demonstrate that I can combine ideas into a statement, a plan, a product, etc. that was previously unknown to me; e.g., I develop a program that includes the best parts of each of these ideas.

4. What does the teacher do as this level?

   The teacher reflects, extends, analyzes, and evaluates.

5. What are the typical questions I can ask myself that will demonstrate my Synthesis Level of Learning?
   a. Can I create a project plan?
   b. Can I develop a model?
   c. Can I propose a design?

6. What are typical work products?
   a. Answers to Synthesis level exams (problems, multiple choice, and essays).
   b. Synthesis level work products are very similar to Comprehension level work products; however, documentation will include a more extensive discussion of the work. The content, amount, and depth of the presentation is what distinguishes Synthesis level work products from Comprehension level work products; e.g., see items a. through c. above.

7. What are descriptive 'process' verbs?

Arrange	assemble	collect	compose	construct
create	design	formulate	manage	organize
plan	prepare	propose	set up	write

EVALUATION (APPRECIATION)

1. How do I know I have reached this level?

   I have the ability 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.

2. What do I do at this level?

   I make value judgments based on certain criteria such as usefulness and effectiveness. Based on information gained through application, analysis, and synthesis, I can rationally select a process, a method, a model, a design, etc. from among a set of possible processes, methods, models, designs, etc. I evaluate competing plans of action

before actually starting the work. I evaluate work products based on internal standards of consistency, logical accuracy, and the absence of internal flaws; e.g., I can certify that the feasibility of a design has been demonstrated in a report. I evaluate work products based on external standards of efficiency, cost, or utility to meet particular goals or objectives; e.g., I can certify that the quality of the design has been demonstrated in a report.

3. How will the teacher know I am at this level?

   I demonstrate that I can select, judge, or appreciate a process, a method, a model, a design, etc. using appropriate criteria or standards.

4. What does the teacher do at this level?

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

5. What are typical statements and questions I can answer to that will demonstrate or show my appreciation/evaluation?

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

6. What are typical work products?
   a. Answers to Evaluation level exams (problems, multiple choice, and essays).
   b. Evaluation level work products are very similar to Comprehension level work products; however, documentation will include a more extensive discussion of the work. The content, amount, and depth of the presentation is what distinguishes Evaluation level work products from Comprehension level work products; e.g., see items a through f above.

7. What are descriptive 'process' verbs?

appraise	assess	choose	compare	estimate (quality)
evaluate	judge	predict (quality)	rate value	select

Bloom's Revised Taxonomy – Knowledge Dimensions (Types of Knowledge)

Category	Examples
Factual knowledge: The basic elements candidates must know to be acquainted with a discipline.	
Knowledge of terminology.	Technical vocabulary, knowledge of symbols, knowledge of measures, knowledge of acronyms and abbreviations.
Knowledge of specific details.	History of the Internet, descriptions of features of specific WP program, sources of information, knowledge of a programming language.
Conceptual knowledge: The relationships between components or systems.	
Knowledge of classifications.	Types of programming language, types of computer system.
Knowledge of systems.	Basic structure of a computer, ISO reference model, knowledge of a specific operating system.
Knowledge of principles and generalisations.	Stored program concept, programming techniques, Moore's Law.
Knowledge of theories, models and structures.	Program testing strategies, SSADM, program design, JSP.
Procedural knowledge: How to do something, methods of research, criteria for using methods and techniques.	
Knowledge of subject-specific skills and algorithms.	Knowledge of how to use an application package, knowledge of how to write a computer program, sorting and searching algorithms.
Knowledge of subject-specific techniques and methods.	Top-down program design, normalisation, structured programming, systematic fault-finding.
Knowledge of criteria for using procedures.	Knowledge of when to use a specific algorithm, knowledge of criteria for selecting a type of applications package.
Meta knowledge: Knowledge of knowledge.	
Strategic knowledge.	Knowledge of learning strategies, knowledge of the use of heuristics, knowledge of mind mapping.
Knowledge about cognitive tasks.	Knowledge about the relative complexity of different procedures, exam technique.
Self knowledge.	Awareness of personal strengths and weaknesses, awareness of extent of own knowledge about a particular topic.

Bloom's revised Taxonomy – Depth of Knowledge (Cognitive Process)

Cognitive ability	Keywords	Definitions and examples
Remember: Retrieve relevant knowledge from memory.		
Recognising	Identify Match	Matching descriptions with visual representations. For example, identifying the components of a microcomputer system.
Recalling	State Define Describe	Retrieving knowledge from long-term memory. For example, stating four characteristics of information or defining the meaning of an acronym.
Understand: Construct meaning from instructions.		
Interpreting	Estimate Convert Translate	Changing from one form of representation to another. For example, interpreting an advert for computer hardware or converting one unit or measurement to another (e.g. bytes to megabytes).
Exemplifying	Give examples Illustrate Demonstrate Show	Finding a specific example of a concept or principle. For example, relating a specific package﹐s features to the generic features of a type of package.
Classifying	Arrange Classify Categorise Sort	Assigning something to a specific class or category or re-ordering a list. For example, classifying specific software products by software type (freeware, shareware, commercial etc.).
Summarising	Summarise Review	Abstracting a general theme or major points. For example, writing a short review of a specific software product.
Inferring	Predict Deduce Extrapolate	Drawing a conclusion from presented information. For example, given a number of specific cases, produce rules using an expert system.
Comparing	Compare Contrast Evaluate Map	Detecting correspondences between ideas and/or objects. For example, contrast two programming languages in terms of their data structure facilities.
Explaining	Give reasons Explain Justify	Constructing a cause-and-effect model of a system. For example, give reasons for the emergence of the Internet.
Apply: Carry out or use a procedure in a given situation.		
Executing	Carry out Perform Complete	Applying a procedure to a familiar task. For example, carrying out the procedure to install an applications package on a PC.
Implementing	Use Apply Implement	Applying a procedure to an unfamiliar task. For example, using applications software to solve a given problem or writing a piece of code to perform a specific task.
Analyse: Break material into its constituent parts and determine how these parts relate to one another and to the overall structure or purpose.		
Differentiating	Select Choose Discriminate	Identifying similarities and differences, and important and unimportant attributes of objects or systems. For example, choosing a computer system (from two or more provided)

Cognitive ability	Keywords	Definitions and examples
		for a specific task, or selecting a specific data structure to model a given problem.
Organising	Arrange Find Structure Organise	Determining how elements fit together within a system. For example, constructing a flowchart to represent a given problem description or producing a data flow diagram to model a supplied case study.
Attributing	Assign Attribute Deconstruct	Determine a point of view, bias, values or intent. For example, determining the point of view of an author of an essay on the social implications of IT.
Evaluate: Make judgements based on criteria and standards.		
Checking	Check Verify Confirm Monitor Test	Determining inconsistencies or fallacies within a process or product. For example, dry running a given algorithm to check its correctness or testing a program to locate errors.
Critiquing	Evaluate Comment on Review Appraise Critique Judge Critically assess	Detecting the appropriateness of a given procedure for a given problem; measuring a product or process using criteria. For example, judging the appropriateness of two algorithms for a given situation, or evaluating the data security arrangements for a specific scenario.
Create: Put elements together to form a coherent or functional whole; re-organise elements into a new pattern.		
Generating	Suggest Produce Hypothesise Imagine	Producing alternative hypotheses based on criteria. For example, given a description of a hardware error, propose possible causes.
Planning	Plan Design Set-up	Devising a procedure for accomplishing a task. For example, designing a problem solving routine to diagnose and correct hardware problems or planning the creation of a new software product.
Producing	Produce Make Construct Create	Inventing a product. For example, creating a new piece of software or constructing a Web site.

Elaboration of the six levels of thinking in Bloom's taxonomy						
1 **Remembering** *Can the student RECALL information?*	**2** **Understanding** *Can the student EXPLAIN ideas or concepts?*		**3** **Applying** *Can the student USE the new knowledge in another familiar situation?*	**4** **Analysing** *Can the student DIFFERENTIATE between and RELATE constituent parts?*	**5** **Evaluating** *Can the student JUSTIFY an opinion, decision or course of action?*	**6** **Creating** *Can the student GENERATE new products, ideas or ways of viewing things?*
Recognising Locating knowledge in memory that is consistent with presented material. Synonyms • Identifying • Finding • Selecting • Indicating **Recalling** Retrieving relevant knowledge from long-term memory. Synonyms • Retrieving • Naming • Reproducing • Recounting	**Interpreting** Changing from one form of representation to another Synonyms: • Paraphrasing • Translating • Representing • Clarifying • Converting • Rewriting • Restating • Expressing **Exemplifying** Finding a specific example or illustration of a concept or principle Synonyms • Instantiating • Illustrating... • Representing • Giving examples of • Showing **Classifying** Determining that something belongs to a category (e.g., concept or principle). Synonyms • Categorising	**Summarising** Drawing a logical conclusion from presented information. Synonyms • Abstracting • Generalising • Outlining • Précising **Inferring** Abstracting a general theme or major point Synonyms • Extrapolating • Interpolating • Predicting • Concluding • Extending • Generalising **Comparing** Detecting correspondences between two ideas, objects, etc Synonyms • Contrasting • Matching • Mapping **Explaining** Constructing a cause-	**Executing** Applying knowledge (often procedural) to a routine task. Synonyms • Carrying out • Measuring • Constructing • Demonstrating • Computing • Calculating • Manipulating • Operating • Preparing • Producing • Drawing up • Practising **Implementing** Applying knowledge (often procedural) to a non-routine task. Synonyms • Using • Estimating • Predicting • Solving • Changing • Discovering • Explaining how • Verifying	**Differentiating** Distinguishing relevant from irrelevant parts or important from unimportant parts of presented material. Synonyms • Discriminating • Selecting • Focusing • Distinguishing between • Separating • (Sub)dividing • Examining • Relating **Organising** Determining how elements fit or function within a structure. Synonyms • Outlining • Structuring • Integrating • (Re)arranging • Categorising • Ordering • Deriving **Attributing** Determining the point of view, bias, values, or intent underlying presented material. Synonyms • Deconstructing	**Checking** Detecting inconsistencies or fallacies within a process or product. Determining whether a process or product has internal consistency. Synonyms • Testing • Detecting • Monitoring • Concluding • Assessing • Appraising • Discriminating • Determining **Critiquing** Detecting the appropriateness of a procedure for a given task or problem. Synonyms • Judging • Questioning • Justifying • Defending • Discussing • Criticising • Arguing • Including • Rating	**Generating** Coming up with alternatives or hypotheses based on criteria Synonyms • Hypothesizing • Proposing • Developing • Engendering • Synthesising • Providing options **Planning** Devising a procedure for accomplishing some task. Synonyms • Designing • Formulating • Combining • Compiling • Devising • Revising • Putting together • Suggesting **Producing** Inventing a product Synonyms • (Re)constructing • Composing • Modifying • Altering • Building

Elaboration of the six levels of thinking in Bloom's taxonomy						
1 **Remembering** *Can the student RECALL information?*	**2** **Understanding** *Can the student EXPLAIN ideas or concepts?*		**3** **Applying** *Can the student USE the new knowledge in another familiar situation?*	**4** **Analysing** *Can the student DIFFERENTIATE between and RELATE constituent parts?*	**5** **Evaluating** *Can the student JUSTIFY an opinion, decision or course of action?*	**6** **Creating** *Can the student GENERATE new products, ideas or ways of viewing things?*
	• Subsuming • Organising	and-effect model of a system. *Synonyms* • Elucidating • Constructing models	• Finding	• Comparing • Contrast ing • Diagnosing	• Ranking • Valuing	• Enlarging

Revised Taxonomy of Educational Objectives*

Knowledge Dimension	Cognitive Process Dimension →					
This revised Bloom's Taxonomy will assist you as you work to improve instruction to ensure that • *standards, lessons, and assessments are aligned.* • *lessons are cognitively rich.* • *instructional opportunities are not missed.*	1. **Remember:** retrieving relevant knowledge from long term memory 1. Recognizing 2. Recalling	2. **Understand:** determining the meaning of instructional messages 1. Interpreting 2. Exemplifying 3. Classifying 4. Summarizing 5. Inferring 6. Comparing 7. Explaining	3. **Apply**: carrying out or using a procedure in a given situation 1. Executing 2. Implementing	4. **Analyze**: Breaking material into its constituent parts and detecting how the parts relate to one another and to an overall structure or purpose 1. .Differentiating 2. Organizing, 3. .Attributing	5. **Evaluate**: making judgments based on criteria and standards 1. Checking 2. Critiquing	6. **Create:** putting elements together to form a novel, coherent whole or make an original product. 1. Generating 2. Planning 3. Producing
A. **Factual Knowledge**: basic elements that students must know to be acquainted with a discipline or solve a problem in it. a. Knowledge of terminology b. Knowledge of specific details and elements						
B. **Conceptual knowledge**: the inter-relationships among the basic elements within a larger structure that enable them to function together a. Knowledge of classification b. Knowledge of principles and generalizations c. Knowledge of theories, models and structures						
C. **Procedural knowledge**: how to do something: methods of inquiry, and criteria for using skills, algorithms, techniques and methods a. Knowledge of subject specific skills and algorithms b. Knowledge of techniques and methods c. Knowledge of criteria for determining when to use appropriate procedures						
D. **Metacognitive knowledge**: knowledge of cognition in general as well as awareness of one's own cognition a. Strategic knowledge b. Cognitive tasks, including appropriate contextual and conditional knowledge c. Self-knowledge						

* Adapted from Lorin W. Anderson, David R. Krathwohl et al (Eds.) *A Taxonomy For Learning,, Teaching, and Assessing: A Revision of Bloom's Educational Objectives* © 2001; published by Allyn and Bacon, Boston, MA © 2001 by Pearson Education; reprinted by permission of the publisher.

Psychomotor Domain – Simpson's Model

Psychomotor Domain (S**impson**)				
Level	category or 'level'	Description	Examples of activity or demonstration and evidence to be measured	Action verbs which describe the activity to be trained or measured at each level)
1	Perception	Awareness, the ability to use sensory cues to guide physical activity. The ability to use sensory cues to guide motor activity. This ranges from sensory stimulation, through cue selection, to translation.	use and/or selection of senses to absorb data for guiding movement Examples: Detects non-verbal communication cues. Estimate where a ball will land after it is thrown and then moving to the correct location to catch the ball. Adjusts heat of stove to correct temperature by smell and taste of food. Adjusts the height of the forks on a forklift by comparing where the forks are in relation to the pallet. "By the end of the music theatre program, students will be able to relate types of music to particular dance steps."	chooses, describes, detects, differentiates, distinguishes, feels, hears, identifies, isolates, notices, recognizes, relates, selects, separates, touches,
2	Set	Readiness, a learner's readiness to act. Readiness to act. It includes mental, physical, and emotional sets. These three sets are dispositions that predetermine a person's response to different situations (sometimes called mindsets).	mental, physical or emotional preparation before experience or task Examples: Knows and acts upon a sequence of steps in a manufacturing process. Recognize one's abilities and limitations. Shows desire to learn a new process (motivation). NOTE: This subdivision of Psychomotor is closely related with the "Responding to phenomena" subdivision of the Affective domain. "By the end of the physical education program, students will be able to demonstrate the proper stance for batting a ball."	arranges, begins, displays, explains, gets set, moves, prepares, proceeds, reacts, shows, states, volunteers, responds, starts,
3	Guided Response	Attempt. The early stages in learning a complex skill that includes imitation and	imitate or follow instruction, trial and error. Examples: Performs a mathematical	assembles, builds, calibrates,

Psychomotor Domain (S**impson**)				
Lev el	category or 'level'	Description	Examples of activity or demonstration and evidence to be measured	Action verbs which describe the activity to be trained or measured at each level)
		trial and error. Adequacy of performance is achieved by practicing.	equation as demonstrated. Follows instructions to build a model. Responds hand-signals of instructor while learning to operate a forklift. “By the end of the physical education program, students will be able to perform a golf swing as demonstrated by the instructor.”	constructs, copies, dismantles, displays, dissects, fastens, fixes, follows, grinds, heats, imitates, manipulates, measures, mends, mixes, reacts, reproduces, responds sketches, traces, tries.
4	Mechanism	basic proficiency, the ability to perform a complex motor skill. This is the intermediate stage in learning a complex skill. Learned responses have become habitual and the movements can be performed with some confidence and proficiency.	competently respond to stimulus for action Examples: Use a personal computer. Repair a leaking faucet. Drive a car. “By the end of the biology program, students will be able to assemble laboratory equipment appropriate for experiments.”	assembles, builds, calibrates, completes, constructs, dismantles, displays, fastens, fixes, grinds, heats, makes, manipulates, measures, mends, mixes, organizes, performs, shapes, sketches.
level	category or 'level'	Description	Examples of activity or demonstration and evidence to be measured	Action verbs which describe the activity to be trained or measured at each level)
5	Complex Overt Response	expert proficiency, the intermediate stage of learning a complex skill. The skillful performance of motor acts that involve complex movement patterns. Proficiency is indicated by a quick, accurate, and highly coordinated performance, requiring a minimum of energy. This category includes performing without hesitation, and automatic performance. For example, players are often utter sounds of satisfaction or expletives as soon as they hit a tennis ball or throw a football,	Execute a complex process with expertise Examples: Maneuvers a car into a tight parallel parking spot. Operates a computer quickly and accurately. Displays competence while playing the piano. “By the end of the industrial education program, students will be able to demonstrate proper use of woodworking tools to high school students.”	assembles, builds, calibrates, constructs, coordinates, demonstrates, dismantles, displays, dissects, fastens, fixes, grinds, heats, manipulates, measures, mends, mixes, organizes, sketches. NOTE: The key words are the same as Mechanism, but will have adverbs or adjectives that indicate that the performance is quicker, better, more accurate,

Psychomotor Domain (S**impson**)				
Lev el	category or 'level'	Description	Examples of activity or demonstration and evidence to be measured	Action verbs which describe the activity to be trained or measured at each level)
		because they can tell by the feel of the act what the result will produce.		etc.
6	Adaptation	adaptable proficiency, a learner's ability to modify motor skills to fit a new situation. Skills are well developed and the individual can modify movement patterns to fit special requirements.	alter response to reliably meet varying challenges Examples: Responds effectively to unexpected experiences. Modifies instruction to meet the needs of the learners. Perform a task with a machine that it was not originally intended to do (machine is not damaged and there is no danger in performing the new task). “By the end of the industrial education program, students will be able to adapt their lessons on woodworking skills for disabled students.”	adapts, adjusts, alters, changes, integrates, rearranges, reorganizes, revises, solves, varies.
7	Origination	creative proficiency, a learner's ability to create new movement patterns. Creating new movement patterns to fit a particular situation or specific problem. Learning outcomes emphasize creativity based upon highly developed skills.	develop and execute new integrated responses and activities Examples: Constructs a new theory. Develops a new and comprehensive training programming. Creates a new gymnastic routine.	arranges, builds, combines, composes, constructs, creates, designs, formulates, initiate, makes, modifies, originates, re-designs, trouble-shoots.

Adapted and simplified representation of Simpson's Psychomotor Domain ('The classification of educational objectives in the psychomotor domain', 1972). Elizabeth Simpson seems actually to have first presented her Psychomotor Domain interpretation in 1966 in the Illinois Journal of Home Economics. Hence you may see the theory attributed to either 1966 or 1972.

The Affective Domain
http://www.humboldt.edu/~tha1/bloomtax.html & http://academic.udayton.edu/health/syllabi/health/lesson01b.htm

The Affective Domain addresses interests, attitudes, opinions, appreciations, values, and emotional sets. This domain includes the manner in which we deal with things emotionally, such as feelings, values, appreciation, enthusiasms, motivations, and attitudes. The Taxonomy is hierarchical (levels increase in difficulty/sophistication) and cumulative (each level builds on and subsumes the ones below). The levels, in addition to clarifying instructional objectives, may be used to provide a basis for questioning that ensures that students progress to the highest level of understanding. If the teaching purpose is to change attitudes/behavior rather than to transmit/process information, then the instruction should be structured to progress through the levels of the Affective Domain.

Level	Category	Description	Examples	Action Verbs
1	Receiving	The student passively attends to particular phenomena or stimuli [classroom activities, textbook, music, etc.] The teacher's concern is that the student's attention is focused. Intended outcomes include the pupil's awareness that a thing exists. Emphasis is on awareness, willingness to hear, selected attention.	Listens attentively, shows sensitivity to social problems. Listens to others with respect. Listens for and remembers the name of newly “By the end of the women's studies program, students will listen attentively to alternative views on select issues.”	Attends, accepts, asks, chooses, describes, follows, gives, holds, identifies, listens, locates, names, points to, selects, selectively attends to, replies, uses.
2	Responding	The student actively participates. The pupil not only attends to the stimulus but reacts in some way. Emphasis is on active participation on the part of the learners. Learning outcomes may emphasize compliance in responding, willingness to respond, or satisfaction in responding (motivation).	Completes homework, obeys rules, participates in class discussion, shows interest in subject, enjoys helping others. Gives a presentation. Questions new ideals, concepts, models, in order to fully understand them. Knows safety rules and practices them. “By the end of the elementary education program, students will	Acclaims, aids, answers, applauds, approves, assists, complies, conforms, discusses, greets, helps, labels, performs, practices, presents, reads, recites, reports, selects, tells, writes, Volunteers.

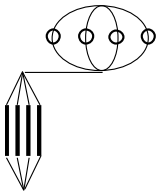
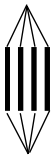
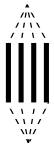
Level	Category	Description	Examples	Action Verbs
			able to comply with PL 94-142."	
3	Valuing	The worth a student attaches to a particular object, phenomenon, or behavior. Ranges from acceptance to commitment (e.g., assumes responsibility for the functioning of a group). Attitudes and appreciation. Valuing is based on the internalization of a set of specified values, while clues to these values are expressed in the learner's overt behavior and are often identifiable.	Demonstrates belief in democratic processes, appreciates the role of science in daily life, shows concern for others' welfare, demonstrates a problem-solving approach. Is sensitive towards individual and cultural differences (value diversity). Shows the ability to solve problems. Proposes a plan to bring about social improvement and follows through with commitment. Informs management on strongly felt matters. "By the end of the political science program, students will be able to debate numerous sides to an argument."	Assists, completes, debates, demonstrates, denies, differentiates, explains, follows, forms, increases proficiency in, initiates, invites, joins, justifies, proposes, protests, reads, relinquishes, reports, selects, shares, studies, supports, works.
Level	Category	Description	Examples	Action Verbs
4	Organization	Brings together different values, resolving conflicts among them, and starting to build an internally consistent value system--comparing, relating and synthesizing values and developing a philosophy of life. Organizes values into priorities by contrasting different systems. The emphasis is on comparing, relating, and synthesizing values.	Recognizes the need for balance between freedom and responsible behavior, understands the role of systematic planning in solving problems; accepts responsibility for own behavior. Explains the role of systematic planning in solving problems. Accepts professional ethical	Accommodates, adheres, alters, arranges, balances, combines, compares, completes, defends, explains, formulates, generalizes, identifies, integrates, modifies, orders, organizes, prepares, relates, synthesizes.

Level	Category	Description	Examples	Action Verbs
			standards. Creates a life plan in harmony with abilities, interests, and beliefs. Prioritizes time effectively to meet the needs of the organization, family, and self. “By the end of the environmental studies program, students will be able to organize the conservation efforts of urban, suburban and rural communities.”	
5	Internalizing values: Characterization by a Value or Value Complex	At this level, the person has held a value system for a sufficiently long time to control his/her behavior, has developed a characteristic "life style." Behavior is pervasive, consistent, predictable, and most importantly, characteristic of the learner. Instructional objectives are concerned with the student's general patterns of adjustment (personal, social, emotional).	Concerned with personal, social, and emotional adjustment: displays self reliance in working independently, cooperates in group activities (displays teamwork), maintains good health habits. Uses an objective approach in problem solving. Displays a professional commitment to ethical practice on a daily basis. Revises judgments and changes behavior in light of new evidence. Values people for what they are, not how they appear. “By the end of the counseling program, students will be able to objectively interpret evidence presented by clients during a therapy session.”	Acts, discriminates, displays, influences, interprets, listens, maintains objectivity modifies, performs, practices, proposes, qualifies, questions, respects, revises, serves, solves, uses evidence, verifies.

Reference

1. Bengamin S. Bloom, Bertram B. Mesia, and David R. Krathwohl (1964). Taxonomy of Educational Objectives (two vols: The Affective Domain & The Cognitive Domain). New York. David McKay

The SOLO taxonomy as a guide to setting and marking assessment

SOLO category	Representation	Type of outcome	Solution to problem	Structure of essay
Unanticipated extension		Create Synthesise Hypothesise Validate Predict Debate Theorise	Solution to problem which goes beyond anticipated answer. Project or practical report dealing with real world ill-defined topic.	Well structured essay with clear introduction and conclusion. Issues clearly identified; clear framework for organizing discussion; appropriate material selected. Evidence of wide reading from many sources. Clear evidence of sophisticated analysis or innovative thinking.
Logically related answer		Apply Outline Distinguish Analyse Classify Contrast Summarise Categorise	Elegant solution to complex problem requiring identification of variables to be evaluated or hypotheses to be tested. Well structured project or practical report on open task.	Essay well structured with a clear introduction and conclusion. Framework exists which is well developed. Appropriate material. Content has logical flow, with ideas clearly expressed. Clearly identifiable structure to the argument with discussion of differing views.
Intermediate			Solution to multiple part problem with most parts correctly solved but some errors. Reasonably well structured project or practical report on open task.	Essay fairly well structured. Some issues identified. Attempt at a limited framework. Most of the material selected is appropriate. Introduction and conclusion exists. Logical presentation attempted and successful in a limited way. Some structure to the argument but only limited number of differing views and no new ideas.

SOLO category	Representation	Type of outcome	Solution to problem	Structure of essay
Multiple unrelated points	||||	Explain Define List Solve Describe Interpret	Correct solution to multiple part problem requiring substitution of data from one part to the next. Poorly structured project report or practical report on open task.	Essay poorly structured. A range of material has been selected and most of the material selected is appropriate. Weak introduction and conclusion. Little attempt to provide a clear logical structure. Focus on a large number of facts with little attempt at conceptual explanations. Very little linking of material between sections in the essay or report.
Single point	|	State Recognise Recall Quote Note Name	Correct answer to simple algorithmic problem requiring substitution of data into formula. Correct solution of one part of more complex problem.	Poor essay structure. One issue identified and this becomes the sole focus; no framework for organizing discussion. Dogmatic presentation of a single solution to the set task. This idea may be restated in different ways. Little support from the literature.
Misses the point			Completely incorrect solution.	Inappropriate or few issues identified. No framework for discussion and little relevant material selected. Poor structure to the essay. Irrelevant detail and some misinterpretation of the question. Little logical relationship to the topic and poor use of examples.